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NEOTROPICAL DORILAIDÆ (PIPUNCULIDÆ) STUDIES, PART 1 (DIPTERA)*

BY D. ELMO HARDY
Assistant State Entomologist, Ames, Iowa

This paper deals with the new species of Neotropical Dorilaidæ in the collection of the Museum of Comparative Zoölogy, Cambridge, Massachusetts. These were kindly loaned to the writer for study by Dr. Joseph C. Bequært. The species herein described will be keyed in a monograph of the Neotropical Dorilaidæ which is being prepared.

Dorilas (Dorilas) latifrons n. sp.
(Figs. 1a-b)

This species is related to *D. flavitarsis* (Williston). The species is distinguished by the broad front and narrow face of the female, the presence of well-developed flexor spines on the femora, by having the r-m crossvein at the basal third of the discal cell and the last section of the fourth vein not sinuous.

Female. Head: Front very broad, expanded in the middle, gray on the sides and with a polished black ridge running its entire length down the middle. At its widest point the front is two times wider than the ocellar triangle. Face very narrow, at its narrowest point it is about equal, in width to one eye facet. The occiput is chiefly gray brownish on the upper portion behind the vertex. The labellum and the third antennal segment are yellow, the palpi and the first two antennal segments are brown. The third segment is acute at apex (Fig. 1a). *Thorax:* Dorsum black in ground color, sides yellow brown. Mesonotum and scutellum chiefly brown pollinose, pleura gray.

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* Published by a grant from the Museum of Comparative Zoology at Harvard College.

Humeri, tegulæ and halteres yellow. Propleura each with a fan of fine pale hairs. Dorso-central hairs conspicuous, marginal scutellars very short, poorly developed. *Legs:* Coxæ and femora, except for yellow apices, dark brown to black. Trochanters, tibiæ and most of tarsi yellow. Femora moderately swollen, flexor spines well developed. Tibiæ without apical spurs or spines and with no strong bristles on the swollen portion. Tarsal claws and pulvilli small, but little longer than the last subsegment of the tarsus. *Wings:* Distinctly fumose, stigma dark brown and not quite filling all of the third costal section. Third section equal in length to the fourth. The two combined are slightly longer than the fifth section. The r-m crossvein is at the basal third of the discal cell and the last section of the fourth vein is gently curved. The last section of the fifth vein is slightly longer than the m crossvein. The petiole of the cubital cell is about equal to the length of the r-m crossvein. *Abdomen:* Sides almost parallel, first three terga opaque, rather densely grayish pollinose; terga four to six subshining, rather lightly brownish dusted above, gray on the sides. First tergum with two strong hairs on each side, abdomen otherwise sparsely but conspicuously covered with short erect hairs. Hind margin of sixth tergum not excised. Venter yellowish brown. *Ovipositor:* Base subshining black, subglobose in shape and with a pair of small tubercles below. Piercer yellow, very slightly upcurved near apex, one and one-half times longer than the base and extending to about the middle of the fourth abdominal segment (Fig. 1b). *Length:* Body, 2.8 mm.; Wings, 3.0 mm.

Male unknown.

Holotype female: Whitfield Hall, Blue Mts., near 4500 ft., Jamaica, Aug. 13–20, 1934 (P. J. Darlington). Type (M.C.Z. No. 27700) returned to the Museum of Comparative Zoölogy.

Dorilas (Eudorylas) replicatus n. sp.

(Figs. 2a-b)

This species is related to *D. rex* (Curran); it is best distinguished by the yellow antennæ and the differences in the hypopygial characters. The outer harpago is two or more times longer than wide and the inner is very differently shaped than in *rex*. The processes on the sixth segment of the abdomen are also distinctive.

Male. Head: Eyes very narrowly separated on the front, nearly touching for half the length of the front. Front and face silvery gray pubescent. Mouth parts and third antennal segment bright yellow. First two antennal segments brown, ventral bristles of second as long as the segment. Third segment gently rounded below, shaped as in *D. rex* (Curran). *Thorax:* Pleura yellow brown in ground color, densely gray pollinose. Dorsum black, covered chiefly with brownish pollen. Propleura bare dorsocentral hairs very small and inconspicuous; marginal fringe of scutellum distinct but the hairs are short and fine. Humeri, tegulæ and knobs of halteres dark brown to blackish. *Legs:* Coxæ and femora chiefly dark brown, the latter with yellow bases and apices. Trochanters, tibiæ and basal subsegments of tarsi yellow; the apical subsegments blackish. All femora silver pollinose on the posterior side and with a row of fine cilia near the upper portion of the posterior side. Flexor spines present only on the basal one-third to one-half of the middle femora, absent on the other legs. Middle coxæ with a row of black bristles at apices above. Hind tibiæ without strong erect bristles on the swelling. *Wings:* Very lightly fumose, stigma brown and filling all of the third costal section. Third section slightly longer than the fourth, the two combined are slightly longer than the fifth. The r-m crossvein is located at the basal third of the discal cell and the last section of the fourth vein is strongly curved. *Abdomen:* Chiefly dark brown with broad gray fasciæ on apical halves of segments, these are broadly interrupted with brown in the middle. *Hypopygium:* Similar in general appearance to *D. rex* except that the apical membranous area is not so large (Fig. 2a). The outer harpago is two times longer than wide and over one-third as long as the inner harpago. The inner is greatly enlarged on apical half and also produced on inner side of basal portion (Fig. 2b). The sixth abdominal segment is developed on the venter into two elongate processes, the larger (first) process is trifid, with two extra teeth developed near base (Fig. 2b). The ædeagus is very complex in structure and possesses numerous points and processes. Length: Body, 4.5–5.0 mm.; female, 6.0 mm. Female unknown.

Holotype male: Canal Zone, Barro Colorado, July 13, 1924 (N. Banks). One paratype male, same locality and collector, June 20, 1924.

Type (M.C.Z. No. 27711) returned to the Museum of Comparative Zoölogy. Paratype deposited in the United States National Museum Collection.

Dorilas (Eudorylas) spinosus n. sp.

(Figs. 3a-c)

This species keys out near *D. stygius* n. sp. but is readily distinguished by the presence of apical spurs or spines on the femora and first two pairs of tibiæ, the long acuminate third antennal segment and bare propleura.

Female. Head: Front equal in width to the face. Upper third of the front shining black, lower portion grayish with a narrow median black line extending about one-half the length of the front. Face and most of occiput gray, upper portion of occiput blackish. Mouthparts and first two antennal segments brown, third segment yellow, long acuminate and covered with long pale pubescence (Fig. 3a). *Thorax:* Mesonotum chiefly polished black, lightly brownish in the middle and gray just inside the humeri. Scutellum subshining, lightly brownish pollinose. Pleura brownish in color, densely gray pollinose. Humeri, tegulæ and halteres yellow. Propleura bare, dorsocentral and scutellar hairs very small and inconspicuous. *Legs:* Yellow red in color except for brownish coxæ, apical subsegments of tarsi and slight discolorations at middles of hind femora. Femora slender, no flexor spines on hind pair. Middle femora each with eight to ten pairs of small flexor spines beneath, front femora with three pairs. All femora with a pale yellow apical spur-like process below (Fig. 3b), this fits into a grooved out portion of the tibia base when the leg is folded. Front and middle tibiæ each with a pair of strong apical spines below. All tibiæ with a strong bristle on the outer side of the swollen portion near the middle (Fig. 3b). *Wings:* Hyaline or nearly so, stigma light brown and filling most of the third costal section. Third section slightly shorter than the fourth. The two sections combined are longer than the fifth. Crossvein r-m located at the basal one-third of the discal cell, the last section of the fourth vein straight or nearly so. *Abdomen:* First and second terga chiefly grayish pollinose, remainder of dorsum polished black, lightly grayish on the sides. First tergum with one or two strong bristles on each side, remainder of abdomen with very sparse short hairs. Sixth tergum not excised on hind margin. *Ovipositor:* Base small, black and globose from a lateral view. From above the base is seen to be divided into two lobes by a median furrow extending longitudinally down the dorsum. Piercer short and straight about as long as the base in length and extending to base of fourth abdominal segment (Fig. 3c). *Length:* 3.0 mm.; wings, 4.0 mm. Male unknown.

Holotype female: Hamburg Farm, Costa Rica, April 1 (C. W. Dodge). One paratype female: Grenada, Grand Etang, Sept., 1910 (Allen and Brues). This specimen is headless.

Type (M.C.Z., No. 27701) and paratype returned to the Museum of Comparative Zoölogy.

Dorilas (Dorilas) stygius n. sp.
(Figs. 4a-c)

This species runs near *D. spinosus* n. sp. but has no apical spines on the tibiæ or femora, the third antennal segment is acute below and the propleura are haired.

Male. Head: Eyes joined for a distance slightly less than the length of the frontal triangle. Front and face gray pubescent, the former shining black on the median swelling. Occiput gray on sides and below, brown to blackish above. Labellum and third antennal segment yellow, palpi and first two antennal segments brown. Second segment with long pale bristles above and below. Third segment acute (Fig. 4a). *Thorax:* Subshining black in ground color, brownish gray pollinose on the dorsum gray on the sides. Humeri yellowish brown. Tegulæ and halteres yellow. Propleura each with a fan of hairs, dorsocentral and marginal scutellar hairs small and inconspicuous. Metanotum evenly convex, without a transverse furrow. *Legs:* Chiefly yellow, coxæ and apical subsegments of tarsi brown, femora with slight discolorations of brown in the middle. Hind trochanters with a dense patch of short yellow pile beneath. Middle coxæ with several long curved hairs at their apices above. Femora rather slender, flexor spines well developed, these are short and black on the middle and hind pairs and long, yellow and bristle like on the first pair. Tibiæ without strong erect bristles medianly. Tarsal claws and pulvilli very small, shorter than the last subsegment of the tarsus. *Wings:* Very lightly fumose, stigma pale brown and filling all of the third costal section. Crossvein r-m situated at about the basal three-sevenths of the discal cell. Last section of the fourth vein very gently curved, almost straight. Ultimate section of the fifth vein slightly shorter than the m crossvein. *Abdomen:* Chiefly polished black, first tergum entirely gray, other terga very narrowly opaque at the anterior margins. Sides of abdomen almost parallel. First tergum with three or four black bristles on each side, remainder of abdomen very sparsely haired. Sixth and seventh terga not visible from a dorsal view. *Hypopygium:* Compressed to the right, with an apical membranous area on the right side. From a dorsal view it is about three-fourths as long as the fifth abdominal segment (Fig. 4b). From a ventral view the membranous area extends to the base of the coxopodite. The coxopodite is largely black in color, the harpagones are yellow and are short, broad, densely gray pubescent and rounded at apices. *Length:* Body, 3.3 mm.; wings, 4.0 mm.

Female. Front broader than the face, shining black on the upper one-third and on frontal tubercle, remainder of front gray. Second antennal segment more yellowish than in the male. The mesonotum and scutellum are more grayish brown pollinose and the sides of the abdomen more distinctly gray than in the male. The femora are entirely yellow. The hind margin of the sixth tergum is straight, not excised. *Ovipositor:* Base reddish brown, subelongate, slightly swollen below, upper surface of base minutely gray pubescent. Piercer yellow, short and straight, about equal to the base in length and extending to about the anterior margin of the third abdominal segment (Fig. 4c). *Length:* Body, 2.6 mm.; wings, 3.3 mm.

Holotype male: Moneague, Jamaica, Jan. 28 (W. S. Brooks). Allotype female same locality and collector, Feb.

Type (M.C.Z. No. 27702) and allotype returned to the Museum of Comparative Zoölogy.

Dorilas (Eudorylas) trinidadensis n. sp.

(Figs. 5a-c)

This species appears to be most closely related to *D. lindneri* (Collin), but eyes of the male are separated on the front. The antennæ are entirely yellow and the genital characters and wing venation are very different.

Male. Head: Eyes very narrowly separated on the front, in the median portion this separation is about one-third the width of one eye facet. Narrowed portion of the front and ocellar triangle shining black, frontal triangle and face silvery gray pubescent. Occiput chiefly gray, brownish to black pollinose on upper portions. Mouthparts and antennæ entirely yellow. Bristles of second antennal segment yellowish brown and rather strong. Third segment obtuse, rounded below (Fig. 5a). Basal portion of each arista yellow. *Thorax:* Mestonotum, scutellum and metanotum black in ground color, the latter grayish pollinose the others chiefly brownish. The hind margins of mesopleura, upper halves of pteropleura and upper margins of sternopleura are yellow, the remainder of the pleura are brown. The humeri are dark yellowish brown, the tegulæ are brown and the halteres yellow except for brownish discolorations on the knobs. The propleura are bare, the dorsocentral hairs are present but weak and the marginal hairs of the scutellum are not well developed. *Legs:* Entirely yellow except for brownish coxæ and apical subsegments of tarsi. Femora slender, flexor spines absent, except on the middle pair. Tibiæ without apical spurs or spines and with no well-developed bristles on the outer sides. *Wings:* Hyaline or nearly so. Stigma brown, filling all of the third costal section. Third section equal in length to the fourth. The fifth section is about equal in length to the third and fourth combined. The r-m crossvein is situated near the basal fifth of the discal cell and the last section of the fourth vein (M1 + 2) is very slightly curved. *Abdomen:* Subshining black, rather lightly brown pollinose on the dorsum and gray on the sides. The side spots of the fifth tergum extend rather conspicuously onto the dorsum, the interruption between the two spots is equal to about one-third the width of the abdomen. The sides of the abdomen are almost parallel. The first tergum has a row of six to eight short dark bristles on each side, the remainder of the abdomen is rather conspicuously covered with short erect hairs. *Hypopygium:* Almost equal in length to the fifth abdominal segment and with a very large apical membranous area (Fig. 5b). The sixth and seventh terga are plainly well developed, visible from a dorsal view. From a lateral view the seventh tergum is wider than that portion of the eighth segment visible from the side (Fig. 5c). The eighth segment is dark brownish black, lightly grayish brown pollinose. The coxopodite is brownish red at the base and yellowish on apical portion. The harpagones are yellowish red in color, are rather slender and each harpago is pointed on the inner apex (Fig. 5c). *Length:* Body, 4.0 mm.; wings, 5.7 mm. Female unknown.

Holotype male: Port of Spain, Trinidad, July (W. S. Brooks).

Type (M.C.Z. No 27703) returned to the Museum of Comparative Zoölogy.

Cephalosphæra panamænsis n. sp.

(Figs. 6a-d)

This species is related to *C. elegantula* (Williston), it is distinguished by the short acuminate, yellow third antennal segment; the opaque abdomen and the all yellow femora.

Male. Head: Eyes joined on the front for a distance slightly greater than the length of the frontal triangle. Front and face silvery pubescent, occiput chiefly gray, lightly brownish above. Mouthparts and antennæ bright yellow, first two antennal segments slightly discolored with brown. Basal portion of the aristæ yellow. Second antennal segment with one long and two or more shorter bristles below. Third segment moderately pointed but not long acuminate below (Fig. 6b), rather densely covered with yellow pubescence. *Thorax:* Mesonotum black in ground color densely brown pollinose except for gray anterior corners. Posterior calli, scutellum and pleura brownish yellow in ground color, the scutellum is brownish dusted and the pleura gray. The humeri are bright yellow in color, the tegulæ are yellow brown. The halteres are chiefly pale yellow with the knobs slightly discolored. The propleura each have a fan of yellow hairs, the dorsocentral hairs are present although weak and the scutellum has a row of moderately developed hairs on its hind margin. *Legs:* Coxæ and apical subsegments of tarsi brown, legs otherwise yellow. Femora stout, flexor spines well developed. Tibiæ without strong apical spines or spurs and with no unusually strong bristles on the outer side of the swollen portion. *Wings:* lightly brownish fumose, stigma brown and occupying all of the third costal section. Third section two times longer than the fourth and equal in length to the fifth costal section. Crossvein r-m situated at the basal third of the discal cell. The appendix on the fourth vein (M1 + 2) is one and one-half times longer than the r-m crossvein and extends nearly half way to the wing margin. The last section of the fourth vein (beyond the fork of M1 and 2) is one and two-thirds longer than the penultimate section. The last section of the fifth vein is equal to the m crossvein in length. The petiole of the cubital cell is one and one-half times longer than the r-m crossvein. *Abdomen:* Chiefly brown pollinose, very faintly subshining. First tergum entirely gray. Terga two to four gray only on the sides. Fifth tergum with a large silvery gray spot on each side occupying posterior half of segment, these are rather narrowly separated in the middle. First tergum with four or more strong black bristles on each side. Abdomen otherwise very sparsely haired. *Hypopygium:* Asymmetrical, developed toward the right side and with an elongate membranous area at the apex (Fig. 6d). The hypopygium, from dorsal view is about equal to slightly longer than the fifth abdominal segment. The seventh tergum is poorly developed, scarcely visible from a dorsal view. The eighth tergum is brown in color, the coxopodite and harpagones are yellow brown. The harpagones are short and broad and appear to be blunt at apices. *Length:* Body, 5.2–5.5 mm.; wings, 6.7–7.5 mm.

Female: The front is entirely silvery. At its widest portion it is scarcely more than half as wide as the face just above the mouthparts. Front gradually narrowed, at the ocellar triangle it is about equal to the width of one ocellus. The coxæ are yellow and the apical subsegments of the tarsi lighter brown than in the males. The tarsal claws and pulvilli are very strongly developed especially on the front two pairs of legs, about equal in length to the last three subsegments of tarsus. Each subsegment of posterior tarsi is produced into a moderately strong spur-like projection at the apex above (Fig. 6a). The abdomen is rather clavate in shape, being widest at segments four to five. The sides of the abdomen are yellowish brown in ground color with the gray side spots as in the male. The gray markings of the fifth tergum are rather broadly joined on the hind margin and the sixth is all gray except for a small basal portion which is brown. Hind margin of sixth tergum not excised. Ovipositor base rather globose, swollen above and below. Base chiefly polished bright red, covered with white pubescence on the anterior portion. Piercer straight, yellow, about equal in length to its base and extending slightly beyond apex of the third abdominal segment (Fig. 6c). *Length:* Body, 5.0 mm.; wings, 6.0 mm.

Holotype male: Barro Colorado, Canal Zone, Panama, July 17, 1924 (N. Banks). Allotype female: Ancon, Canal Zone, Aug. 6, 1924 (N. Banks). One paratype male, same locality and collector as type, July 16, 1924.

Type (M.C.Z. No. 27704) and allotype returned to the Museum of Comparative Zoölogy. Paratype retained temporarily in the Iowa State College collection, to be later deposited in the U. S. National Museum.

Tömösváryella tuberculata n. sp.

(Figs. 7a-d)

This species is related to *T. sachtlebeni* (Aczel). It differs by having a strong tubercle on each of the hind femora, by having the projection on the hind trochanters more broad and rounding at the apex, by having the abdomen more polished and sparsely haired and the harpagones more broad and curved on outer edges.

Male. Head: Junction of the eyes about equal to the length of the upper portion of the front. Upper portion of front shining black, lower part and face gray pubescent. Occiput gray on sides and below, subshining black above. Mouthparts and antennæ brownish yellow, third antennal segment rather long acuminate below (Fig. 7c). *Thorax:* Chiefly shining black in ground color, very lightly brownish pollinose on the dorsum, scutellum polished black. Humeri and halteres yellow, tegulæ black. Dorsocentral hairs very fine, scutellum almost bare. *Legs:* Chiefly black, apices of femora, broad apices and bases of tibiæ and the first four subsegments of tarsi yellow. Hind trochanters each with a large rounded projection at apex below. Each hind femur with a strong tubercle near base below (Fig. 7a). Femora moderately slender, first two pairs with flexor spines, hind pair with flexor bristles. Tarsal claws and pulvilli small, about as long as the last subsegment of tarsus. *Wings:* Hyaline, without a perceptible tinge of brownish. Third costal section just one-half as long as the fourth, the two combined are about one-half as long as the fifth section. Crossvein r-m situated slightly before the middle of the discal cell and last section of fourth vein very slightly curved, almost straight. *Abdomen:* Metallic black, very lightly dusted with gray. Sides slightly rounding, widest at about segments three to four. First tergum with a fan of five or six long dark bristles on each side, abdomen otherwise almost devoid of conspicuous hairs. Seventh tergum slightly visible from dorsal view. *Hypopygium:* About three-fourths as long as the fifth abdominal segment, with a large apical membranous area, which extends through the middle to the base on the dorsum (Fig. 7d). Hypopygium microscopically gray pubescent. From a ventral view the coxopodite is elongate, slightly longer than the sclerotized portion of the eighth segment on the right side. The harpagones are broad and curved, cupped out on the inner surfaces and pointed at inner apices (Fig. 7b). The inner harpago is the larger of the two. *Length:* Body and wings, 2.8 mm. Female unknown.

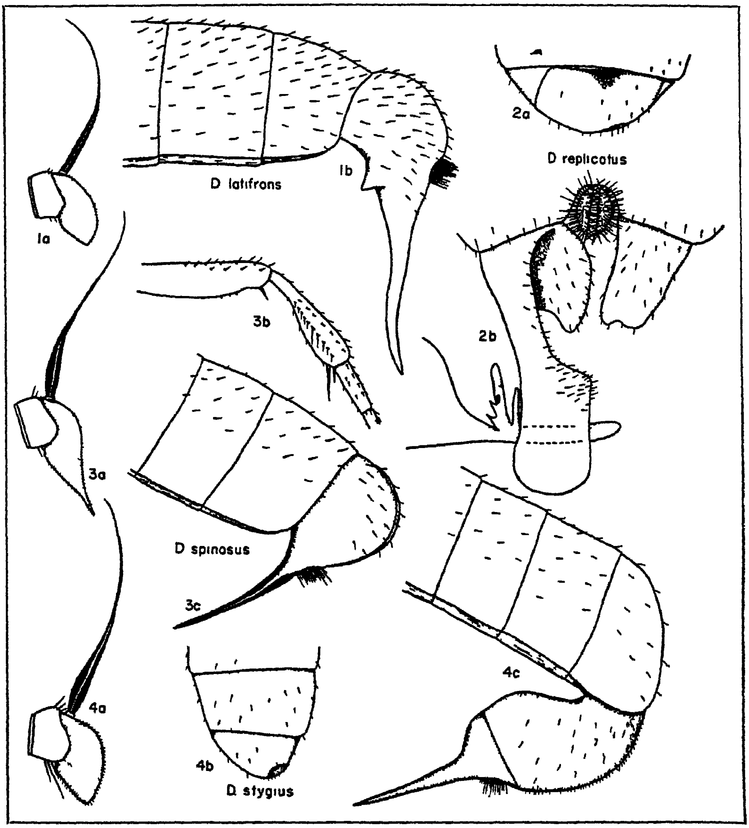
Holotype male: Soledad near Cienfuegos, Cuba, Aug. 6–20 (N. Banks). One paratype male, same data at type.

Type (M.C.Z. No. 27705) returned to the Museum of Comparative Zoölogy. The paratype has been deposited in the U. S. National Museum.

EXPLANATION OF PLATE 1

- Fig. 1. *Dorilas latifrons* n. sp.
  - a. Antenna.
  - b. Female abdomen, lateral.
- Fig. 2. *D. replicatus* n. sp.
  - a. Male hypopygium, dorsal.
  - b. Ventral of male harpagones and tip of sixth abdominal segment.
- Fig. 3. *D. spinosus* n. sp.
  - a. Antenna.
  - b. Front leg of female.
  - c. Female abdomen, lateral.
- Fig. 4. *D. stygius* n. sp.
  - a. Antenna.
  - b. Male hypopygium, dorsal.
  - c. Female abdomen, lateral.

PSYCHE, 1948 VOL 55, PLATE 1

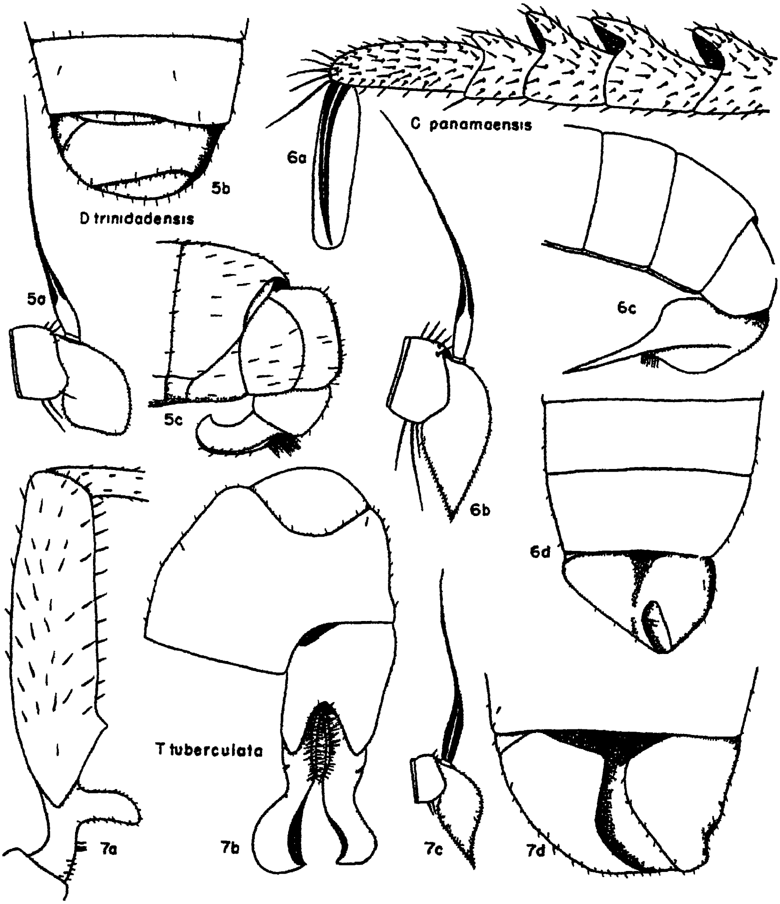


HARDY—NEOTROPICAL DORILAIDAE

EXPLANATION OF PLATE 2

Fig. 5. *D. trinidadensis* n. sp.
  a. Antenna.
  b. Male hypopygium, dorsal.
  c. Male hypopygium, right side.
Fig. 6. *Cephalosphæra panamænsis* n. sp.
  a. Hind tarsus, female.
  b. Antenna.
  c. Female abdomen, lateral.
  d. Male hypopygium, dorsal.
Fig. 7. *Tömösváryella tuberculata* n. sp.
  a. Hind trochanter and femur, male.
  b. Male hypopygium, ventral.
  c. Antenna.
  d. Male hypopygium, dorsal.

PSYCHE 1948 VOL. 55, PLATE 2



HARDY—NEOTROPICAL DORILAIDAE

NEW AND LITTLE KNOWN SPECIES OF NEARCTIC TRICHOPTERA

By D. G. Denning

University of Wyoming, Laramie, Wyoming

Examination of additional caddis fly material from western United States has resulted in the recognition of several new and little known species. Descriptions of five of the new species appear in this paper. Unless otherwise stated the types of the new species are in the writers collection at the University of Wyoming. I would like to express my thanks to Dr. L. J. Milne who made available one of his holotypes for comparison with a species illustrated herein.

Leptocella aeolius n. sp.

This is an interesting species which can readily be differentiated from other described Nearctic Leptocella by the fuscous colored wings. The clasper and tenth tergite are also markedly different from other described species. This species was collected from a clear, cold, rapidly flowing mountain stream at approximately 7,500 feet elevation.

Male.—Forewing length 10 mm. General color of forewings and hindwings reddish brown, considerably brighter toward apex, a series of transverse whitish spots from stigma to apex, fringe along margin near tip of anal veins reddish brown, fringe at apex of hind wing reddish brown.

Genitalia as in fig. 1. Ninth segment with dorsum produced caudad as a concave dorsal hood, below which arises a pair of long finger-like processes; lateral margin produced caudad as a triangular side piece. Tenth tergite practically ventrad in position, wide basally, gradually acuminate, slightly upturned distally, apices narrowly incised for a short distance, fig. 1A; pair of curved filaments which arise near base of tergite expanded at apex into a slightly convex plate. Clasper with basal flap narrow, irregular in outline, neck narrow; mesal lobe subacute from lateral aspect, spatulate from dorsal or ventral aspect; lateral apical lobe very irregular and bearing several long stout setae. Between base of claspers arise a pair of filamentous lobes bearing at apex two long slender setae. Ædeagus semi-membranous with characteristic spoonlike ventral plate.

Holotype. Male.—Sybille River, near Wheatland, Wyoming, June 19, 1947 (D. G. Denning).

Athripsodes pfadti n. sp.

This species is very similar to *arielles* Denning, but differs from it in details of the tenth tergite, such as the clusters of minute spines along the lateral surface, in the wide sclerotized lobe of the clasper, and the presence of two large internal spines in the aedeagus.

Male.—Length 8–9 mm. Eyes small, separated on dorsum by about five times the dorsal width of one eye. Antennæ rather short, about one and one-third times the length of the forewing; basal portion of each segment white, gradually becoming uniformly brownish. Wings light brown, a prominent white spot at tip of anal veins, a fringe of white hairs along margin, extending from R to M_3. Legs a lighter shade than wings.

Genitalia as in fig. 2. Ninth segment with base wide, considerably narrowed toward center; articulation with cerci quite indistinct. Cerci, from dorsal aspect, subtriangular, apices separated by a wide triangular incision, a few long fine setæ present. Tenth tergite reaching caudad slightly beyond cerci, apex upturned; viewed from dorsal aspect apical margin straight; lateral surface with two clusters of minute spines, one nearly circular group of six, and one group of three. Clasper with basal portion projected caudad a short distance which appears as a prominant sub-triangular point when viewed from the caudal aspect, fig. 2A; apical segment semi-membranous, digitate, bearing a scattering of rather stout setæ; sclerotized lobe shorter than apical segment, considerably expanded apically, margin rounded when viewed laterally; somewhat hammer-shaped from caudal view, fig. 2A, a pair of small setæ along margin; caudal surface of basal

NEW AND LITTLE KNOWN SPECIES OF NEARCTIC TRICHOPTERA

By D. G. Denning

University of Wyoming, Laramie, Wyoming

Examination of additional caddis fly material from western United States has resulted in the recognition of several new and little known species. Descriptions of five of the new species appear in this paper. Unless otherwise stated the types of the new species are in the writers collection at the University of Wyoming. I would like to express my thanks to Dr. L. J. Milne who made available one of his holotypes for comparison with a species illustrated herein.

Leptocella aeolius n. sp.

This is an interesting species which can readily be differentiated from other described Nearctic Leptocella by the fuscous colored wings. The clasper and tenth tergite are also markedly different from other described species. This species was collected from a clear, cold, rapidly flowing mountain stream at approximately 7,500 feet elevation.

Male.—Forewing length 10 mm. General color of forewings and hindwings reddish brown, considerably brighter toward apex, a series of transverse whitish spots from stigma to apex, fringe along margin near tip of anal veins reddish brown, fringe at apex of hind wing reddish brown.

Genitalia as in fig. 1. Ninth segment with dorsum produced caudad as a concave dorsal hood, below which arises a pair of long finger-like processes; lateral margin produced caudad as a triangular side piece. Tenth tergite practically ventrad in position, wide basally, gradually acuminate, slightly upturned distally, apices narrowly incised for a short distance, fig. 1A; pair of curved filaments which arise near base of tergite expanded at apex into a slightly convex plate. Clasper with basal flap narrow, irregular in outline, neck narrow; mesal lobe subacute from lateral aspect, spatulate from dorsal or ventral aspect; lateral apical lobe very irregular and bearing several long stout setae. Between base of claspers arise a pair of filamentous lobes bearing at apex two long slender setae. Ædeagus semi-membranous with characteristic spoonlike ventral plate.

Holotype. Male.—Sybille River, near Wheatland, Wyoming, June 19, 1947 (D. G. Denning).

Athripsodes pfadti n. sp.

This species is very similar to *arielles* Denning, but differs from it in details of the tenth tergite, such as the clusters of minute spines along the lateral surface, in the wide sclerotized lobe of the clasper, and the presence of two large internal spines in the aedeagus.

Male.—Length 8–9 mm. Eyes small, separated on dorsum by about five times the dorsal width of one eye. Antennæ rather short, about one and one-third times the length of the forewing; basal portion of each segment white, gradually becoming uniformly brownish. Wings light brown, a prominent white spot at tip of anal veins, a fringe of white hairs along margin, extending from R to M_3. Legs a lighter shade than wings.

Genitalia as in fig. 2. Ninth segment with base wide, considerably narrowed toward center; articulation with cerci quite indistinct. Cerci, from dorsal aspect, subtriangular, apices separated by a wide triangular incision, a few long fine setæ present. Tenth tergite reaching caudad slightly beyond cerci, apex upturned; viewed from dorsal aspect apical margin straight; lateral surface with two clusters of minute spines, one nearly circular group of six, and one group of three. Clasper with basal portion projected caudad a short distance which appears as a prominant sub-triangular point when viewed from the caudal aspect, fig. 2A; apical segment semi-membranous, digitate, bearing a scattering of rather stout setæ; sclerotized lobe shorter than apical segment, considerably expanded apically, margin rounded when viewed laterally; somewhat hammer-shaped from caudal view, fig. 2A, a pair of small setæ along margin; caudal surface of basal portion bears several large and small setæ. Ædeagus with apical portion semi-membranous, trilobed from lateral view, two prominant spines internally, fig. 2B.

Female.—Length 6.5–8 mm. Very similar in general characteristics to male. Genitalia as in fig. 2C.

Holotype. Male.—Albany County, Wyoming, Little Laramie River, August 1, 1947 (R. E. Pfadt).

Allotype. Female.—Same data as for holotype.

Paratypes.—17 males, 21 females, same data as for holotype.

Ecclisomyia maculosa Banks

Originally described from Colorado; very little is known of the distribution of this characteristically western species.

Male.—Length 9 mm. Wings light brown, rather conspicuously irrorate with white markings. Legs a trifle lighter brown than wings, spines black, spurs luteous. Genitalia as in fig. 3 and 3A.

Female.—Genitalia as in fig. 3B. General characteristics very similar to male. Cercus, from lateral aspect, short and stocky, apex blunt; from dorsal aspect V-shaped incision extends nearly to base; cerci form a tubular structure with basal portion fused to dorsal portion of tenth segment. Dorsal portion of tenth segment very thin, spatulate, deeply incised, lateral portion also very thin and extending to subgenital plate. Subgenital plate seen from ventral aspect truncate, short and wide, reaching caudad almost to distal margin of dorsal portion of tenth segment.

This species was collected at an elevation of approximately 10,700 feet, along a shallow, narrow swift flowing mountain stream. The majority of the specimens collected were found resting on the banks of the stream, often only an inch or so above the water.

Wyoming: Albany County, Snowy Range Mountains, July 26, 1947 (D. G. Denning); 19 males, 3 females.

Limnephilus utahensis n. sp.

This species is closely related to *occidentalis* Banks and *labus* Ross. It can easily be differentiated from these species by the short stocky tenth tergite, the shape of the cerci and claspers and the presence of 3 subapical spines on the lateral arm of the ædeagus.

Male.—Length 14–15 mm. Forewings tawny except for irregular dark brown markings along the veins and a concentration of irregular dark brown markings from the cubitus to the inner margin of the wing. Front femur with a linear patch of black spinules along under side and with 2 small apical spines; front basitarsus subequal to following segment; front tibia with 8 to 10 black spines including one apical pair. Eighth tergite with mesal projection covered with black spinules.

Genitalia as in fig. 4. Ninth segment with lateral portion wide, markedly reduced to a narrow bridge dorsally, portion next to cerci arcuate. Lobes of tenth tergite very short and stocky, apex small and only slightly upturned. Cerci, from lateral view, only a trifle longer than wide, posterior margin slightly sinuate; convergent from dorsal view and with an acute apex; viewed from caudal aspect, fig. 4A, mesal margin black and sharply bent mesad. Claspers longer than wide, sides practically parallel, dorsal and ventral corners rounded, a small acute projection along distal margin. Lateral arms of ædeagus fig. 4B, shorter than main body, apically enlarged into a lobe bearing a brush of fine setæ, apex acute, just caudad to apex occur three small spines as in fig. 4B. Apparently some modification of these subapical spines may occur, as on one lateral arm of the paratype the most ventrad spine is considerably elongated, fig. 4C.

Female.—Length 16 mm. Genitalia as in fig. 4D. Same color and general structure as male. Ninth segment completely divided dorsally. Tenth tergite tubular, apex attenuated, bifid from dorsal view, fig. 4E.

Holotype. Male.—Callao, Juab County, Utah, August 7, 1945 (G. F. Knowlton), at light. [U. S. National Museum Collection.]

Allotype. Female.—Same data as for holotype.

Paratype. Male. Same data as for holotype.

Holotype and allotype deposited in the U. S. National Museum.

Dr. G. F. Knowlton collected these specimens from a light trap operated near a small pond fed from an artesian well. Callao is located just southwest of the Great Salt Lake Desert.

Lepidostoma veleda n. sp.

This species belongs to the Pluvial group and bears closest resemblance to *ormea* Ross and *rayneri* Ross. It can be distinguished from these species by the lateral lobe of the tenth tergite which bears a dorsal and ventral spine opposite one another and the short truncate condition of the tenth tergite when seen from the dorsal aspect.

Male.—Length 7.5–8 mm. Basal segment of antenna long, almost equal to dorsal width of head, a scattering of black scales over most of segment, especially dense along mesal surface. Third segment of maxillary palpus with a very dense brush of long black scales. Costal cells of forewing reflexed nearly to media, resultant pocket lined with dense brown setæ and black scales which are especially heavy along margin, in a few individuals a scattering of black scales will be found extending beyond margin of pocket.

Genitalia as in fig. 5. Ninth segment annular, tergite produced into a triangular projection. Tenth tergite divided into a pair of divergent lateral lobes, separated on meson to base, from dorsal aspect, fig. 5A, short, truncate, prominent acute dorsal spine near center of margin; from lateral aspect, fig. 5, dorsal spine directed dorsad, in a straight line with the ventral spine which is curved slightly cephalad. Claspers long, narrow, convergent from ventral view, at base the short digitate process is gradually curved caudad, apex sub-acute with small acute caudad directed process near apex on mesal surface. Ædeagus long, tubular, base bulbous, apex of main portion submembranous and with a pair of long, slender, acute tubular processes along dorsal surface.

Female.—Length 8–8.5 mm. Similar to male except for sexual dimorphic characters. Ninth and tenth tergites, fig. 5B, relatively short; ninth tergite becomes a darkened sub-acute angulation at apex, the tenth tergite lobes divided and broadly rounded at apex. Spermatheca, fig.

5C, with ventral bridge well marked and crossing spermatheca near margin.

Holotype. Male.—Albany County, Wyoming, Snowy Range Mountains, near Centennial, Wyoming, August 3, 1947 (D. G. Denning).

Allotype. Female.—Same data as for holotype.

Paratypes.—5 males, 2 females; Woods Landing, Wyoming, August 10, 1947 (D. G. Denning). 3 males; Poudre River, 15 miles west of Teds Place, Colorado, August 17, 1947 (D. G. Denning). 3 males, 4 females; Poudre River, approximately 15 miles east of Cameron Pass, Colorado, August 19, 1947 (D. G. Denning). 10 males; Rocky Mountain National Park, Colorado, August 9, 1947 (D. G. Denning).

In all instances the species was collected only from clear, swift flowing mountain streams.

Lepidostoma ormea Ross

This recently described species was previously known only from a male collected in Utah.

Colorado: Illinois River, south of Walden; August 10, 1947 (D. G. Denning), 1 male.

Collected from a shallow, clear swift flowing stream at approximately 8,000 feet elevation.

Rhyacophila mirus n. sp.

This species is very closely related to *alberta* Banks.

Male.—Length 11–12 mm. Color brownish yellow, with a scattering of dark brown markings over most of forewing. First and second pair of legs light brown except for a light yellowish color over apical portion of tibia, third pair of legs luteous. Sternum of sixth and seventh segment with a short acute mesal projection.

Genitalia as in fig. 6. Ninth segment with a wide emargination laterally resulting in the ventral half being greatly narrowed. Tenth tergite declivous from lateral view, reaching ventrad to margin of clasper; from dorsal aspect, fig. 6A, slender, practically same width throughout, apical portion produced into a pair of thin plates, the inner pair (best viewed from lateral aspect) slender and rounded distally, the outer pair convex, wide and distally nearly truncate. Basal segment of clasper long, almost two and one-half times as long as wide, margins nearly parallel; apical segment about one-half as long, the ventral margin attenuated as in fig. 6. Ædeagus long, reaching to caudal margin of basal segment of clasper, apical half of exposed portion slender, tubular, apex bifid; lateral arms from ventral aspect, fig. 6B, reaching caudad one-third length of apical segment of clasper, apices gradually convergent, near middle of lateral arms area is expanded, its ventral surface bearing a number of minute spicules and its margin bearing a series of seven flat setæ.

Female.—Length 12 mm. Same general color and characteristics as for male. Sixth sternum with an acute mesal projection. Eighth sternum with a wide mesal projection. Genitalia simple, tubular and tapering from base to apex.

Holotype. Male.—Albany County, Wyoming, Snowy Range Mountains, outlet of Mill Pond; September 25, 1947 (D. G. Denning).

Allotype. Female.—Same data as for holotype.

Paratypes. Same data as for holotype, except August 31, 1947, 2 males.

All specimens collected from a clear, cold, swift-flowing mountain stream at approximately 10,500 feet elevation.

Rhyacophila verrula Milne

The collecting of this species in southeastern Wyoming constitutes a considerable extension to its previously known range of British Columbia, Alberta, Oregon and Washington. Male genitalia, fig. 7, drawn from a specimen compared to holotype.

Wyoming: Snowy Range Mountains, outlet of Lake Marie; August 31, 1947 (D. G. Denning), 3 males, 1 female. Collected along a rapid mountain stream at 10,500 feet elevation. Albany County, Snowy Range Mountains, outlet of Mill Pond; September 25, 1947 (D. G. Denning), 1 male. Collected along a rapid mountain stream at 10,500 feet elevation. Albany County, Snowy Range Mountains, Nash Fork Creek; September 25, 1947 (D. G.

Denning), 3 males. Collected along a rapid mountain stream at 9,600 feet elevation.

Polycentropus halidus Milne

This species has not been recorded since it was described in 1936 by Milne from New Mexico. The determination of the specimen used in the illustration, fig. 8, was checked by Ross.

California: Morgan Hill; September 5, 1939 (C. E. Mickel), at light, 2 males, 1 female.

Arizona: Oak Creek Canyon, Banjo Bill Forest Camp; June, 1942 (C. P. Alexander), 2 males.

Polycentropus variegatus (Banks)

Very little is known regarding the distribution of this species previously recorded from Washington and British Columbia. The collecting of the species in southeastern Wyoming is a very interesting extension in its known range. Male genitalia as in fig. 9.

British Columbia: Cowichan Lake, August 1940 (C. P. Idyll), 2 males.

Wyoming: Pole Mountain, near Laramie; August 16, 1947 (D. G. Denning), 1 male. Collected along a clear, shallow mountain stream at approximately 7,500 feet elevation.

California: Lake Tahoe; August 20, 1916 (L. Bruner), 1 male, 1 female.

EXPLANATION OF PLATE 3

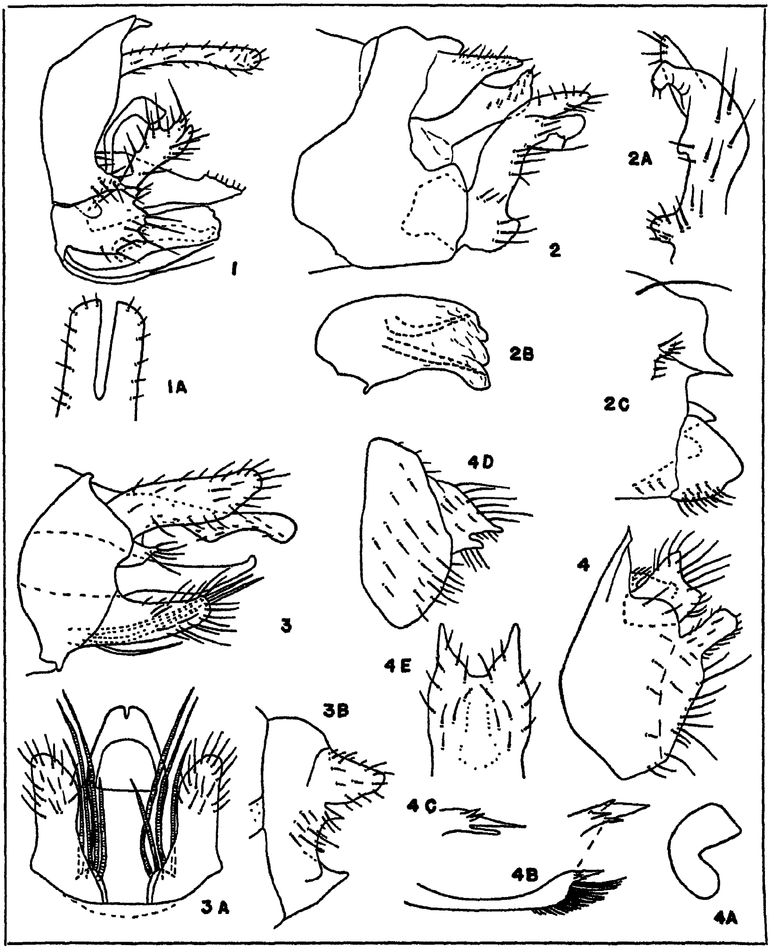
Fig. 1. *Leptocella æolius,* lateral aspect; 1A, tenth tergite, ventral aspect.

Fig. 2. *Athripsodes pfadti,* lateral aspect; 2A, clasper, caudal aspect; 2B, ædeagus, lateral aspect; 2C, lateral aspect of female.

Fig. 3. *Ecclisomyia maculosa* lateral aspect; 3A, ventral aspect; 3B, lateral aspect of female.

Fig. 4. *Limnephilus utahensis,* lateral aspect; 4A, margin of claspers, caudal aspect; 4B, lateral arm of ædeagus; 4C, apex of lateral arm of ædeagus of paratype; 4D, lateral aspect of female; 4E, dorsal aspect of tenth tergite of female.

PSYCHE, 1948 VOL. 55, PLATE 3



DENNING—NEARCTIC TRICHOPTERA

Explanation of Plate 4

Fig. 5. *Lepidostoma veleda*, lateral aspect; 5A, dorsal aspect of tenth tergite; 5B, lateral aspect of female; 5C, spermatheca.

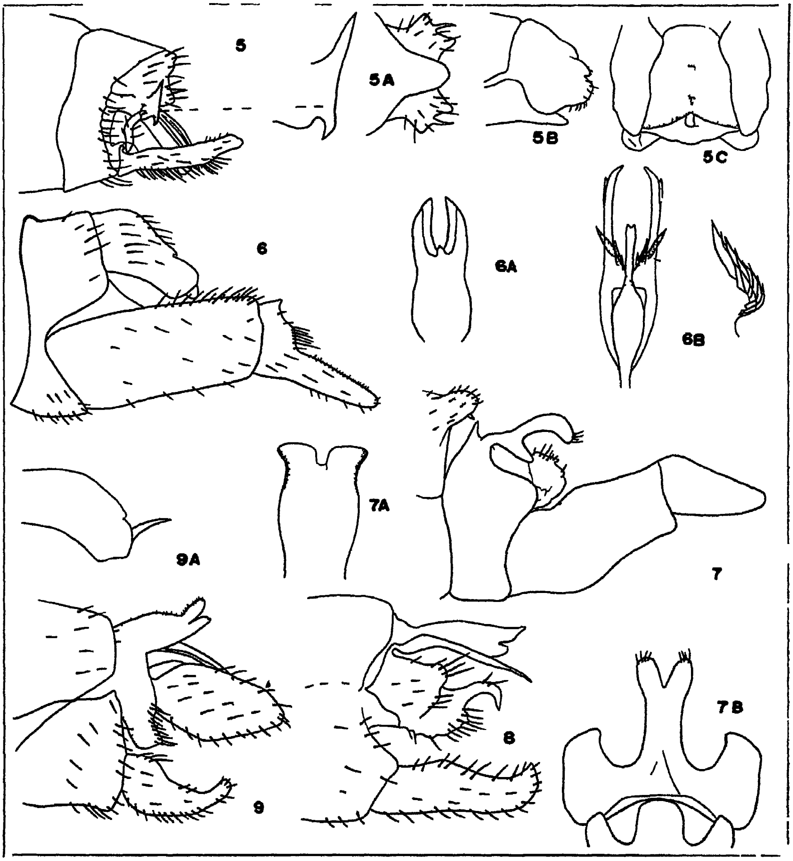
Fig. 6. *Rhyacophila mirus*, lateral aspect; 6A, dorsal aspect of tenth tergite; 6B, ventral aspect of ædeagus and lateral arms.

Fig. 7. *Rhyacophila verrula*, lateral aspect; 7A, sheath of ædeagus from ventral aspect; 7B, dorsal aspect of ninth and tenth tergites.

Fig. 8. *Polycentropus halidus*, lateral aspect.

Fig. 9. *Polycentropus variegatus*, lateral aspect, 9A, lateral aspect of ædeagus.

PSYCHE 1948 VOL 55, PLATE 4



DENNING—NEARCTIC TRICHOPTERA

NOTES ON CHINESE PANORPIDÆ (MECOPTERA)[1]

By F. M. Carpenter
Harvard University

Panorpa diceras was described by McLachlan in 1894 from Szechuan, China. Lack of knowledge of the genital structures of the male type, which has been in private hands and inaccessible for many years, has prevented recognition of the species, though both Dr. Tjeder and I attempted it. Acquisition of the McLachlan collection by the British Museum (Natural History) in 1938 has finally made the type available for study, and in reply to my request for information about it, Mr. D. E. Kimmins very kindly sent me two drawings, which enable recognition of the insect. Since it is now apparent that both Dr. Tjeder and I have misidentified *diceras*, I include here an account of its structure and of the taxonomic changes involved.

Panorpa diceras McL. (Fig. 1)

Panorpa diceras McLachlan, 1894, Ann. Mag. Nat. Hist., 13: 423 (*nec P. diceras* Tjeder, 1935, Arkiv för Zoologi, 27A(33): 7; *nec P. diceras* Carpenter, 1938, Proc. Ent. Soc. Wash., 40: 270).

Panorpa grahami Carpenter, 1938, Proc. Ent. Soc. Wash., 40: 272, figs. 5, 9.

The drawings of the genital bulb of the type sent by Mr. Kimmins are reproduced in the accompanying figure. A comparison of these with Dr. Tjeder's illustrations of his species, and with my drawings (1938) of the supposed *diceras* reveals obvious differences, especially in the form of the hypovalvæ and ventral valves. On the other hand, comparison with my figures of the genitalia of *grahami* leaves no doubt of the identity of this species with *diceras*. In other details of body structure, as well as wing coloring, *grahami* also agrees with Mc-

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

Lachlan's account of *diceras*. It is significant that the type of *grahami* was collected only a few miles from Tachienlu, the type locality of *diceras*. My failure in 1938 to recognize the specimen of *grahami* as *diceras* was due to an incorrect interpretation of McLachlan's description of the hypovalvæ.

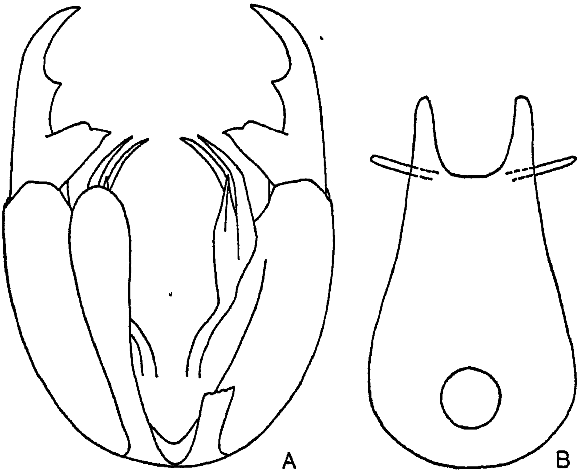


Fig. 1. *Panorpa diceras* McLachlan. A, ventral view of ♂ genital bulb, drawn from type in the British Museum (Natural History) by D. E. Kimmins. B, preëpiproct of same specimen.

I have already (1938, p. 271) proposed a new name (*tjederi*) for the species which Tjeder identified and described as *diceras*. The following is a description of the species which I originally identified as *diceras*:

Panorpa kimminsi, n. sp.

Panorpa diceras Carpenter, 1938, Proc. Ent. Soc. Wash., 40: 270, fig. 2, 10, 11 (*nec P. diceras* McLachlan, 1894).

The genital bulb of the male and the internal skeleton of the genital segment of the female have already been described and figured in the paper mentioned above, so I add here only an account of the rest of the body and the wings: Body yellow, with black in the region of the ocelli and between the antennal bases; also, a black stripe along each side of the rostrum; eyes gray-brown; thorax and abdomen yellow, with a black stripe laterally, sixth abdominal segment of male with a pair of short posterior horns, as in *diceras*. Fore wing: length 15–18 mm.; width, 4 mm.; wing membrane dusky hyaline, with greyish yellow at apex; pterostigma yellow.

Holotype (♂): Omei (11,000 ft.), Szechuan, China, July, 1936 (D. C. Graham); in the U. S. National Museum. This is the specimen which I illustrated under the name *diceras* McL. in 1938, figures 2 and 10.

Allotype (♀): near Tachienlu (5000–8500 ft.), Szechuan, China, June 18–July 12, 1923 (D. C. Graham); in U. S. National Museum. This specimen was illustrated in the same paper (1938), figure 11.

Paratypes: 1 ♂, Suifu, Szechuan, China, Oct. 1, 1929 (D. C. Graham); in U. S. National Museum. 1 ♀, west of Yachow (2000-7500 ft.), Szechuan, China, June 14–18, 1922 (D. C. Graham); in U. S. National Museum. 1 ♂, same collection data as last, in Museum of Comparative Zoölogy. 1 ♀, same collection data as allotype, in U. S. National Museum. 2 ♀, 9 miles southwest of Tachienlu (9000–11,000 ft.) Szechuan, China, June 25–27, 1923; in Museum of Comparative Zoölogy.

There is an additional female, in poor condition and not designated a paratype, from 30 miles north of Tachienlu, Szechuan, 12,000 ft., July 5–9, 1923 (D. C. Graham).

This species, which I have named for Mr. D. E. Kimmins of the British Museum (Natural History), belongs to the *diceras* group of *Panorpa*, but differs from the other species included there by the curved forceps and peculiar configuration of the ventral valves of the male.

NOTES ON *MELANOPHORA RORALIS* (LINN.) (DIPTERA)

By Frank Morton Jones
Wilmington, Delaware

In 1903 Professor C. T. Brues published (Entomological News, vol. 14, p. 291) an interesting account of his discovery, made at Woods Hole, Massachusetts, that the larva of the Dexid fly, *Melanophora roralis* (Linn.), is an internal parasite of "sow-bugs" (Oniscidæ, *Porcellio* sp.), pupating within the body-cavity of its deceased host.

Meager European references had indicated the possibility of a wider range of larval habits for this insect; but in 1934 the careful work of W. R. Thompson (Parasitology, vol. 26, pp. 378–448, pls. 15–22) demonstrated that *roralis* (with related species) occurs regularly as a parasite of the Oniscidæ, and his taxonomic studies of larva, puparium and adult placed *roralis* on a firm basis for future recognition. Of this species his material was not abundant, and his few field-records related to European conditions.

The following observations on *roralis* were made at Vineyard Haven, Marthas Vineyard Island, Massachusetts, hence only a few miles from the place of Professor Brues' discovery of 1903. In the summer of 1946 I was conducting a series of experiments with various chemicals to which insect-attractant qualities had been attributed. In some of these tests the selected chemical was dropped upon a plaster-of-Paris disc substituted for the usual bait-receptacle in a Rummel-type trap. On August 28, as I uncorked a small vial for rebaiting one of these traps with isoamyl salicylate, a small black-winged fly circled about the rim of the uncorked vial; and in the nine days terminating on that date, forty-one flies of that same species had appeared in the trap thus baited, along with only three flies of other species. No comparable response to other baits was noted, in the three similar and adjacent traps operated through this period. These results seemed indicative that isoamyl salicylate possesses a strong selective attraction for this one fly, *Melanophora roralis* (Linn.); but the termination of the experiments then prevented further confirmatory observations.

With the later-acquired knowledge of the identity of the insect and after reference to Professor Brues' account of its parasitic status, it seemed desirable to give *roralis* closer attention through the succeeding summer. However, that endeavor encountered unexpected difficulties, for not only was 1947 generally recognized as a year of unusual insect scarcity, but in May and June of that year 2700 acres of Marthas Vineyard, including the area under observation, had been sprayed from the air with DDT, and the oniscid host of *roralis* was not present in numbers approaching those of the preceding year. Only by persistent search and daily observation did some features of the economy of the insect become apparent.

Upon my arrival on Marthas Vineyard, June 22, *roralis* was promptly detected as a "window-pane" fly. Thereafter, through the summer, five bait-traps yielded one hundred and six examples of *roralis;* many others were recorded from the windows, screens and walls of the house, indoors and out. These adults occurred over two well-defined periods—the first extending from (at least) late June to mid-July, then after nearly a month's interval (actually by August 10) the flies commenced to appear again and were present throughout the remainder of the month and as late as September 5, when opportunity for observation terminated. These dates seem to indicate that in New England *roralis* has at least two annual broods. In England (Thompson) the winter is passed as second-stage larvæ and no summer brood appears.

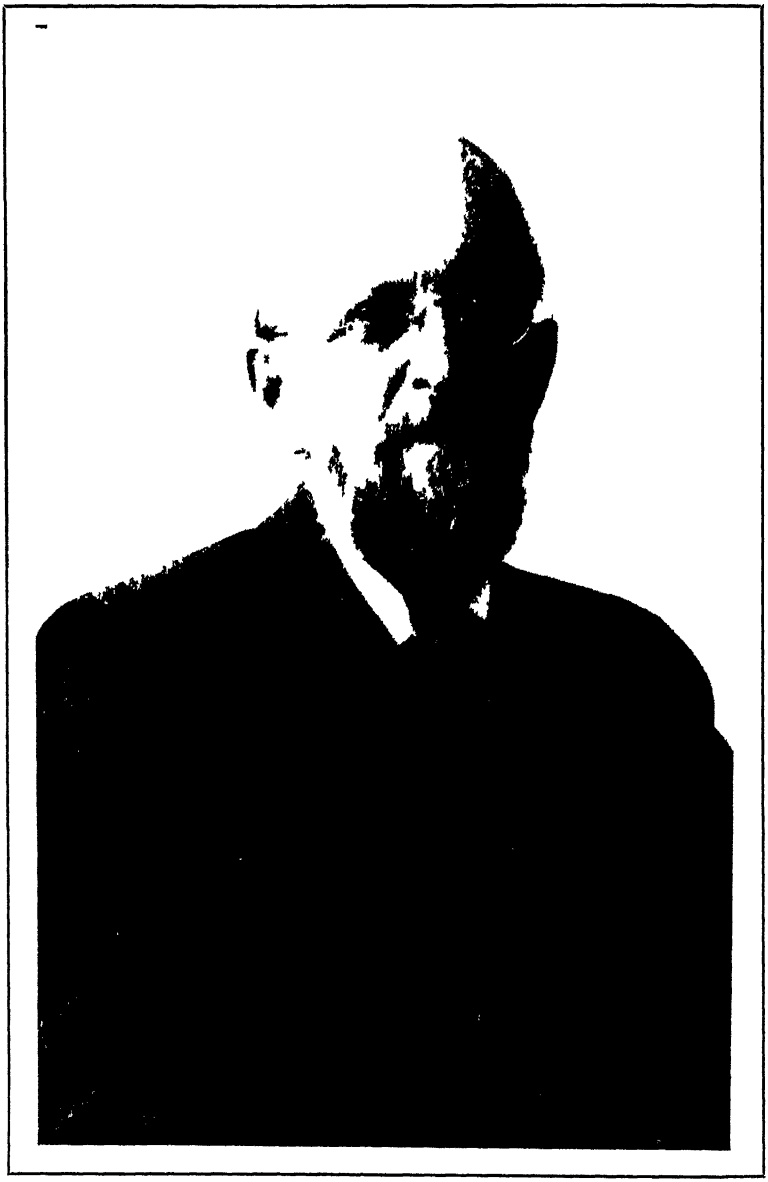
Search for the early stages of *roralis* was continued throughout the summer, more successfully under the loose bark of fallen trees, where sowbugs often congregate. In early July a few empty and broken puparia, each partly enclosed in the dry fragments of a sowbug, were found. On July 23 two living larvæ and one puparium were found, each in a body of a recently deceased sowbug. Mean-while, twenty-five apparently healthy adult sowbugs had been installed in a gallon jar, with layers of bark for shelter and concealment, and pieces of apple and of potato for food. On August 10 this jar was found to contain 18 living sowbugs, fragments of 7 others, and 3 living puparia of *roralis;* on August 21, only 13 living sowbugs remained, and no additional *roralis.* That is, at least 12% parasitism was indicated and a much larger fatality through cannibalism, a recognized sowbug trait. Examination of the 13 survivors showed that among these, two species were represented—*Oniscus asellus* Linn. and *Porcellio scaber* Latr.; and the fragments enclosing *roralis* puparia indicated that both these species had served as hosts. Emergences of *roralis* adults (four) took place on August 11 and August 15.

Adult *roralis* is diurnal in habit, rarely appearing among the overnight captures of the bait-traps, and only once in a light-trap operated throughout the season.

Further experiments with chemical baits (conducted in collaboration with Mr. Charles P. Kimball of Rochester, New York) forced some modification of the belief that isoamyl salicylate possesses a unique attraction for *roralis,* for in 1947 traps baited with other chemicals sometimes captured fully as many flies of this species, and it became a question whether the entrance of the flies into the traps, in part at least, might not be ascribed to their habit of penetrating and exploring narrow crevices and cavities, rather than a response to attractive odors. A few experiments with an unbaited trap tended to confirm that suspicion.

The almost uncanny ability of *roralis* to gain entrance to screened houses may be attributed to this habit. Indoors, these flies do not usually evince strong attraction toward food, and their lives are apparently short, for their dead bodies occur commonly on window-sills, in cobwebs, and not rarely in bathtubs or in bowls of washstands where perhaps the presence of moisture attracts them.

Long ago it was suggested (W. D. Pierce, 1907, U. S. Bull. Ent. 64, pp. 15 and 22) that sowbugs, because of their unsavory habitats and scavenger habits, might be concerned in the transmission of disease. From most modern dwellings the sowbug is usually excluded; but *roralis*, its intimate associate, passes all ordinary barriers and may penetrate to all the rooms of human dwellings. Should the suspicion against the sowbug be substantiated, then *roralis* too may be recognized as a potential source of danger.



Theodore Dru Addison Cockerell

THEODORE DRU ADDISON COCKERELL

As this issue of Psyche goes to press, we have received notice of the death of Professor T. D. A. Cockerell on January 26, 1948. The following sketch of his life is presented as a tribute and in recognition of his entomological contributions. The accompanying photograph was kindly sent by Dr. Norma LeVeque.

Born in Norwood, England, in 1866, Professor Cockerell came to this country at the age of twenty-one and for the last forty-four years of his life was on the faculty of the University of Colorado. He made many collecting trips, even to such remote places as India, Australia, Peru, Siberia, and South Africa. His interests in natural history were very broad and his publications, which number over three thousand, include contributions to botany, paleontology, and zoology. Insects, of course, were his main interest. His early investigations were on Lepidoptera, scale insects and Hymenoptera. If he had a specialty, it was the taxonomy of the wild bees. While at the University of Colorado, he worked extensively on insects in the Florissant Shales, which were not far from Boulder. He also published many papers on fossil insects in the Green River Shales, the ironstone nodules of Illinois, the coal beds of Maryland, the Baltic amber, and several other deposits. He was a regular contributor to Psyche. His first paper in this journal, on Jamaican butterflies, appeared in 1893 (vol. 6); the last, on African bees, in 1946.

Professor Cockerell was an inspiring teacher. His wide knowledge and boundless enthusiasm attracted students to the University of Colorado from remote parts of the country. That many of these have become outstanding zoologists and entomologists is due in large measure to the unique abilities of their teacher.

The Editorial Board.

ACCIDENTAL PARASITISM OF A TICK BY A TICK

By George Anastos

Biological Laboratories, Harvard University

A case of a tick feeding on another tick was recently observed amongst a lot of several thousand ticks taken off domestic animals in the Netherlands East Indies, and sent for study by Dr. F. C. Kraneveld of the Bacterioloog Veeartsenijkundig Instituut, Buitenzorg, Java. A partially engorged female *Rhipicephalus hæmaphysaloides paulopunctatus* Neumann had its hypostome deeply inserted in the ventral surface of the abdomen of a fully engorged female *Boöphilus microplus* (Canestrini). The vial containing these two specimens listed the host as a cow from Batavia, Java; so it would appear that the *Boöphilus* was attached and feeding on the cow at the time it was collected.

This should be considered a case of accidental parasitism. It cannot well be called "cannibalism" since it involves ticks not only of different species but even of different genera. The cases called "cannibalism" by previous authors concerned individuals of the same species only.

A survey of the literature has revealed the following cases known as "cannibalism": C. A. Barber (1895, Nature 52, p. 199) figures a male *Amblyomma variegatum* (*Hyalomma venustum*) attached to the posterior end of a female of the same species. Hunter and Hooker (1907, Bur. Ent. Bull. 72, p. 35) reported finding in a lot of live ticks from southwest Texas a female cattle tick, *Boöphilus annulatus*, with its mouthparts inserted in another tick (sex not given). Hooker, Bishopp, and Wood (1912, Bur. Ent. Bull. 106, p. 32) found amongst specimens sent to their laboratory a male *Boöphilus annulatus* (*Margaropus annulatus*) with its hypostome inserted into the side of an engorged female. Wood in two instances observed in the laboratory *Ornithodoros turicata* adults attaching and feeding on recently fed adults of the same species. Their final record was of two female *Dermacentor andersoni* (*Dermacentor venustus*) taken off a horse at Lakeside, Washington; when received in the laboratory the smaller female was attached to the more fully engorged one. Sergent (1930, Bull. Soc. Hist. Nat. Afr. du Nord XXI, p. 195) observed, in tick feeding experiments on a calf, that an unengorged nymph of *Hyalomma mauritanicum* attached itself to an engorged nymph of the same species. Roubaud and Colas-Belcour (1935, Ann. Parasit. Paris, T13 No. 5, p. 427) record two males of *Aponomma crassipes* on a female of the same species taken off a lizard in Tonkin, Indo-China. E. Francis (1938, Pub. Hlth. Rep., U. S. Pub. Hlth. Serv. 53, p. 2234) records a starved female *Ornithodoros turicata* attached and feeding on a fully engorged male, and an unfed fourth stage nymph feeding on a fed nymph of this same species. G. E. Davis (1941, Journal of Parasitology 27, p. 432) believes the term "cannibalism" to be a misnomer since the tick host is not consumed nor harmed enough to interfere with its normal functions. He records two cases wherein last stage nymphs of *Ornithodoros parkeri* were punctured by ticks which proceeded to completely engorge.

From the small number of known cases it would appear that ticks seldom feed on each other. Lack of a suitable host in nature might induce a tick to feed upon an already engorged tick; or else a tick might accidentally pierce another tick if the host were heavily infested.

A NEW *DISCOTHYREA* FROM NEW CALEDONIA (HYMENOPTERA: FORMICIDÆ)

By William L. Brown, Jr.
Biological Laboratories, Harvard University.

I have recently received a small collection of ants made by Charles L. Remington on New Caledonia during the spring of 1945. Among them is a single specimen of a new species of the interesting genus *Discothyrea* Roger. This genus, hitherto unrepresented on the island, belongs to a group of relict genera occurring in New Zealand, Australia, the East Indies and the warmer parts of the Americas. The find would seem to further strengthen the belief in the Australia–New Caledonia–New Zealand land-connections hypothesized as existing in the past, and would also further indicate a past contact between these areas and South America.

Discothyrea remingtoni new species

Worker. Total length measured from anterior clypeal border of the extended head to the posteriormost point on the curved surface of gastric segment II, 2.6 mm. Length of head alone, 0.80 mm.; Weber's length of thorax 0.73 mm.; length of petiole, 0.19 mm.; of gaster, measured around the curve of the vault to the anteriorly directed last segmental apex, 1.24 mm.

Head from the front broadly oval, cephalic index 88; broadest at about the posterior third of its length, with the sides somewhat converging and only slightly convex anteriorly; the posterior corners broadly rounded and passing easily into the evenly convex posterior border. Seen from the side, the posterior corners are evenly rounded. The structure of the frontal region and carinal plate much as in other *Discothyrea* species, the median ridge continuing upward to beyond the midlength of the head. Clypeus moderately projecting, broadly rounded anteriorly. A slight area above each antennal insertion on each side of the carinal plate very weakly impressed. Mandibles short, strong, convex, with knife-edged inner (masticatory) borders and acute apices. Antennal scapes massively clavate, their respective funiculi eight-jointed, the last joint exceptionally large and heavy. Eyes a little larger than most *Discothyrea*, with more than 12 and less than 18 ommatidia in each, situated just above the anterior quarter of the sides and a little toward the front or dorsal side of the head.

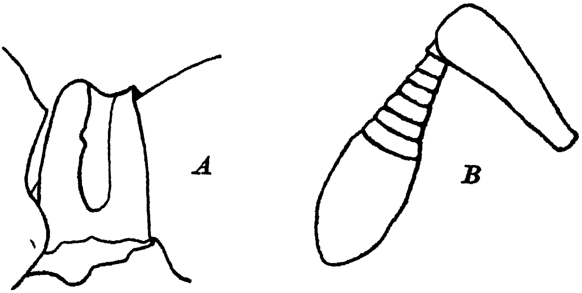


Fig. 1. *Discothyrea remingtoni* new species, worker. A, petiole and adjoining segments in profile; B, antenna.

Thorax not radically different from the usual run of *Discothyrea*, rather stout, with blunt, rounded humeral angles; epinotal teeth low and blunt, their bases extended down the sides of the epinotal declivity as low vertical lamellæ. The teeth are located somewhat farther down the epinotal declivity than in Emery's figures of *clavicornis* in the Genera Insectorum and in the original description of that species (1).

The petiole is in the form of a thickened disc divided, in at least the dorsal half, by a transverse sulcus into anterior and posterior low, rounded rims, the central planes of which are parallel to each other, the anterior being slightly the larger of the two. Seen from the rear, the profile gives the effect of a semicircle within a concentric semicircle, the anterior rim being the outer semicircle and the posterior the inner. The posterior rim is truncate at its highest point, thus providing a collar for the reception of the base of the first gastric segment. The sulcus which runs around the dorsum ends halfway down the sides of the node described; the median ventral keel is moderately prominent and bears a blunt process anteriorly. The gaster long, its second segment vaulted in the manner of most proceratiine ants and the undercurved apical segments directed anteriorly.

The integument in general clearly shining through the dense pilosity, very sparsely and finely punctulate. The impressed spaces on each side of the median facial ridge coarsely and closely punctate, scarcely shining. Clypeus, carinal fusion process and antennæ finely reticulate-punctate, subopaque to opaque.

The entire body clothed densely with short suberect to erect whitish hairs, which are slightly shorter on the head and antennæ, slightly more sparse on the legs.

Head ferrugineous yellow, the gaster, mandibles and antennæ somewhat lighter; thorax rich mahogany red, the petiole lighter; legs and tip of gaster medium yellow.

Holotype: One worker deposited in the Museum of Comparative Zoölogy, No. 27788. Labelled "7 mi. S.E. La Foa, New Caledonia, Rocky Humus. March 11, 1945 (C. L. Remington)."

The nearest species of the genus in size is *D. antarctica* Emery (2), which measures 2 mm., but *antarctica* is yellow throughout and has a differently shaped petiole. *D. globus* Forel and *D. clavicornis* Emery are much smaller and are described as having opaque integument; *globus* is red-brown throughout and *clavicornis* "flava"; both have differently shaped petioles. Mann (3) described specimens of *clavicornis* from the Solomons as "rich brownish red." Since Emery's type is a unique and possibly teneral, it would be best to wait for further collecting before formally differentiating Mann's specimens as a color race. Forel's var. *sauteri* of *globus* from Formosa should be accorded at least subspecific rank on the basis of the description (4).

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(2) ————. Zool. Jahrb. Syst. (1895) **8**: 266.
(3) Mann, W. M. Bull. Mus. Comp. Zool. Harvard (1919) **63**: 288.
(4) Forel, A. Ent. Mitt. (1912) **1**: 47.

THE SUPPOSED NYMPHS OF THE PALÆODICTYOPTERA[1]

By F. M. Carpenter
Harvard University

Our knowledge of the metamorphosis of Carboniferous insects is meager. Inferences have been made about their immature stages, but actual knowledge is restricted to the fossils which have been found. Furthermore, although some Carboniferous nymphs are known, it is difficult to associate them with adults. Specific association is obviously impossible; the best that can be done is association by family or order. If the fossils concerned are members of an existing order, the association can be made with near certainty, for the living immature and imaginal forms provide a basis for comparison; but if the fossils are adults belonging to an extinct order, the problem of identifying their immature stages is more difficult. This is well illustrated by the nymphs which have been referred to the extinct order Palæodictyoptera, and which have been extensively discussed in the literature on wing development. Speculation about these nymphs and their significance has been so great that I have thought it worth-while to summarize here what is actually known about them.

Five palæodictyopterous nymphs have been described up to the present time, four by Handlirsch (1906) and one by Goldenberg (1873). All are from Carboniferous strata. Through the courtesy of Dr. R. S. Bassler and Dr. G. A. Cooper, I have been able to examine the four Handlirsch specimens in the United States National Museum. I have not seen the Goldenberg fossil, which is in the collection of the Natural History Society at Bonn, Germany, but it has been redescribed and figured by v. Schlechtendal (1913) and Guthörl (1934). Handlirsch placed all these species in the "form genus" *Palæodictyopteron,* but he also used that term as a generic name for adult Palæodictyoptera with obscure family relationships. Since, for reasons given below, I consider their ordinal position obscure, I have assigned these nymphs to Insecta Incertæ Sedis.

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[1] Published with a grant from the Museum of Comparative Zoölogy at Harvard College.

Insectorum gen. indet. *anglicanum* Handl.
Plate 6, figures 1 and 5; plate 7, figure 1.

(*Palæodictyopteron*) *anglicanum* Handlirsch, 1906, Foss. Ins.: 52, pl. 8, fig. 16.

The specimen on which this species is based is preserved in an ironstone nodule, from Sedgley, England, and is now in the U. S. National Museum (Type no. 38109, Beale Collection). Handlirsch's figure of the fossil, which is reproduced here (plate 6, figure 1) depicts a slender wing or wing-pad, a fragment of another, parts of the head (including one compound eye), thorax and abdomen. The wing-pad is shown extending laterally from the thorax, its longitudinal axis being perpendicular to the longitudinal axis of the thorax. This figure has been referred to several times in entomological literature and has caused much speculation about the development of the Palæodictyoptera. Comstock, in his "Wings of Insects" (1918), refutes Handlirsch's contention that immature Palæodictyoptera were aquatic by pointing out that it would be "difficult to imagine insects with laterally projecting wing buds, such as these nymphs possessed, swimming through the water." Lemche (1940) uses the same figure as a source of important evidence to aid his theory of polyphylectic origin of wings in insects. Similarly, Forbes (1943) has employed it to support his erection of an extinct order, Anasaxia. The Palæodictyoptera differed from the Anasaxia, in part, by having nymphs "with the wing-pads extending directly out, unlike all other insects."

The fossil responsible for all this speculation is poorly preserved, as shown in the accompanying photograph (plate 7, figure 1). So far as I have been able to determine, it consists only of a single wing or wing-pad and suggestions of the abdomen (plate 6, figure 5). The thorax and head are not discernible and the object which

Handlirsch identified as an eye is plant material, like that covering most of the nodule. There is therefore no evidence whatever that the wing-pads of this insect were developed perpendicularly to the thorax. The wing itself, however, shows more details than are indicated in Handlirsch's figure or description. It is about 7 mm. long, with an anterior margin that is slightly concave proximally and convex near the middle. The most obvious feature of the wing is a prominent longitudinal ridge (or groove, in the counterpart), which is probably the radius (R1). Between it and the anterior margin is a weaker interrupted ridge, and posterior to it is what appears to be a forked vein. There is also a suggestion of a posterior submarginal vein.

The part of the abdomen that is preserved consists of five or six broad segments. These few segments indicate an abdomen that is large in proportion to the wing,—a peculiarity suggesting that the insect was a nymph. This was probably the case, but there is another possibility worth mentioning: the wing of the fossil is much like the elytron of some Protelytroptera, even to the concave anterior margin, the heavy R1, and the posterior, submarginal vein. Without more precise knowledge of the fore wing and at least part of the hind wing, we can reach no conclusion on the ordinal position of this fossil. There is certainly nothing to show that it is palæodictyopterous, and Handlirsch, although describing the specimen as a nymph of that order, gave no reason for his conclusion.

Insectorum gen. indet. *virginianum* Handl.
Plate 6, figure 2; plate 7, figure 2.

(*Palæodictyopteron*) *virginianum* Handlirsch, 1906, Foss. Ins.: 63, pl. 8, fig. 19; 1906, Proc. U. S. Nat. Mus., 29: 689, fig. 16.

The type of this species is preserved in black shale, from soft coal beds near Redbird, West Virginia, and is now in the National Museum (No. 25635). Handlirsch's drawing of the fossil is reproduced here (plate 6, figure

2); it depicts a basal piece of the fore wing-pad, a complete hind wing or its bud, and fragments of the thorax and abdomen. As in the case of the preceding species, the figure shows the wings extending laterally from the thorax, and it was reproduced by Comstock (1918, fig. 81) to demonstrate the lateral formation of wings in palæodictyopterous nymphs.

Examination of the fossil convinces me that Handlirsch, in making his drawing, confused plant remains with those of the insect, as can be seen from the accompanying photograph (plate 7, figure 2). The fragment of the fore wing represented in his figure is either a piece of a plant or of the insect's body; it is clearly not a wing or wing-bud, and it bears a relationship to the true wing different from that shown in his figure. The parts of the "thorax" and "abdomen" are clearly of plant origin. The wing itself is about 10 mm. long, and much more oval than shown in Handlirsch's figure. There are faint indications of veins or ridges, but they cannot be followed satisfactorily because of numerous wrinkles. Although this wing is very different from that of the foregoing insect in shape, size and texture, there is no evidence that it was either palæodictyopterous or a nymphal structure.

Insectorum gen. indet. *mazonum* Handl.
Plate 6, figure 3.

(*Palæodictyopteron*) *mazonum* Handlirsch, 1906, Foss. Ins.: 63, pl. 8, fig. 17; 1906, Proc. U. S. Nat. Mus., 29: 688, fig. 14.

This is preserved in an ironstone nodule, from the vicinity of Morris, Illinois (Type no. 38831, U. S. National Museum). Handlirsch's figure is correct in depicting the distal part of a wing, 18 mm. long, which could be either nymphal or mature. The apparent thickness of the fossil suggests that it is a wing-pad, possibly of a roach or Protorthopteron. Its assignment to the Palæodictyoptera is entirely without foundation and Handlirsch gave no reason for placing it there.

Insectorum gen. indet. *latipenne* Handl.
Plate 6, figure 6.

(*Palæodictyopteron*) *latipenne* Handlirsch, 1906, Foss. Ins.: 63, pl. 8, fig. 18; 1906, Proc. U. S. Nat. Mus., 29; 688, fig. 15.

This is also preserved in an ironstone nodule of the Carbondale Formation, from near Braidwood, Illinois (Type no. 38838, U. S. National Museum). As Handlirsch shows, it consists of a poorly preserved wing, 22 mm. long, with a distinctly enlarged anal area. There is no sign of the body and the only suggestion that the fossil is a nymphal wing lies in its apparent thickness. There is nothing, however, to show that it is palæodictyopterous; it could have belonged as well to a nymph of a Protorthopteron or a related Carboniferous order.

Insectorum gen. indet. *hageni* Gold.
Plate 6, figure 4.

Termes hageni Goldenberg, 1873, Fauna saræp. foss., 1: 12; pl. 2, fig. 7b.

(*Palæodictyopteron*) *hageni* Handlirsch, 1906, Foss. Ins.: 62, pl. 8, fig. 15; v. Schlectendal, 1913, Nova Acta Leop., 98: 99, pl. 1, fig. 7; pl. 8, fig. 1.

(*Dictyoneuridæ*) *hageni* Guthörl, 1934, Preuss. Geol. Landes., 164: 84, fig. 48; pl. 13, fig. 6.

This fossil, from the Saarbrücken beds of Germany, was originally thought by Goldenberg to be a wing of a termite. It has subsequently been examined and described by Handlirsch, v. Schlectendal, and Guthörl, who have considered it a palæodictyopterous wing-pad. The discrepancy in the figures of the three last workers is astonishing. Handlirsch shows a complete wing, with entire margins; v. Schlectendal, a wing fragment, the wing being broken posteriorly and distally; Guthörl, a wing fragment with all margins broken. Guthörl's and v. Schlectendal's figures are alike in venation, but differ markedly from Handlirsch's. From these and the photograph reproduced by Guthörl, the fossil appears to be a proximal fragment (9 mm. long) of a small wing, possibly a wing-pad; but there is nothing to show its affinities.

From the foregoing account I believe it is clear that none of the fossils described as palæodictyopterous nymphs can rightly be so considered until further evidence is at hand. Consequently, we have no actual record of the nymphs of these insects and no knowledge whatever of their wing development. It is noteworthy, in this connection, that nymphs of the related order Megasecoptera have been described by Handlirsch (1911), from Illinois, and Bolton (1921) from England. Those studied by Bolton show a venational pattern strongly resembling that of the adult insects of the family Brodiidæ, and since both adults and nymphs occur in the same deposit, their association seems justified. Handlirsch's (*Palæodictyopteron*) *anglicanum*, which has been discussed above, may be a poorly preserved and distorted specimen of this type. His megasecopterous nymph, from the vicinity of Mazon Creek, is so much like Bolton's that its assignment to the Megasecoptera is highly probable. At any rate, none of these nymphs, which, incidentally, show the usual type of wing development, can be referred to the Palæodictyoptera. For the present, therefore, we remain in complete ignorance of their immature stages.

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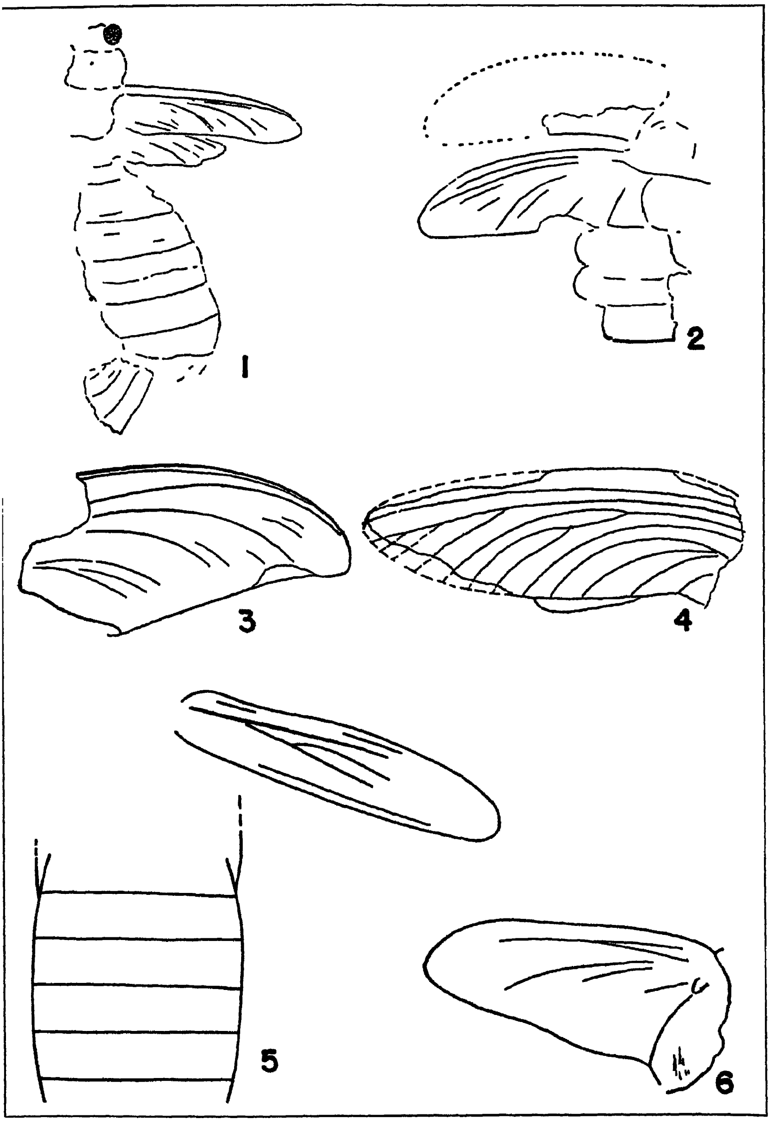
EXPLANATION OF PLATE 6

Fig. 1. *Insectorum* gen. indet. *anglicanum* Handl. From Handlirsch, 1906.
Fig. 2. *Insectorum* gen. indet. *virginianum* Handl. From Handlirsch, 1906.
Fig. 3. *Insectorum* gen. indet. *masonum* Handl. From Handlirsch, 1906.
Fig. 4. *Insectorum* gen. indet. *hageni* Gold. From Guthörl, 1934.
Fig. 5. *Insectorum* gen. indet. *anglicanum* Handl. Original drawing, based upon type.
Fig. 6. *Insectorum* gen. indet. *latipenne* Handl. From Handlirsch, 1906.



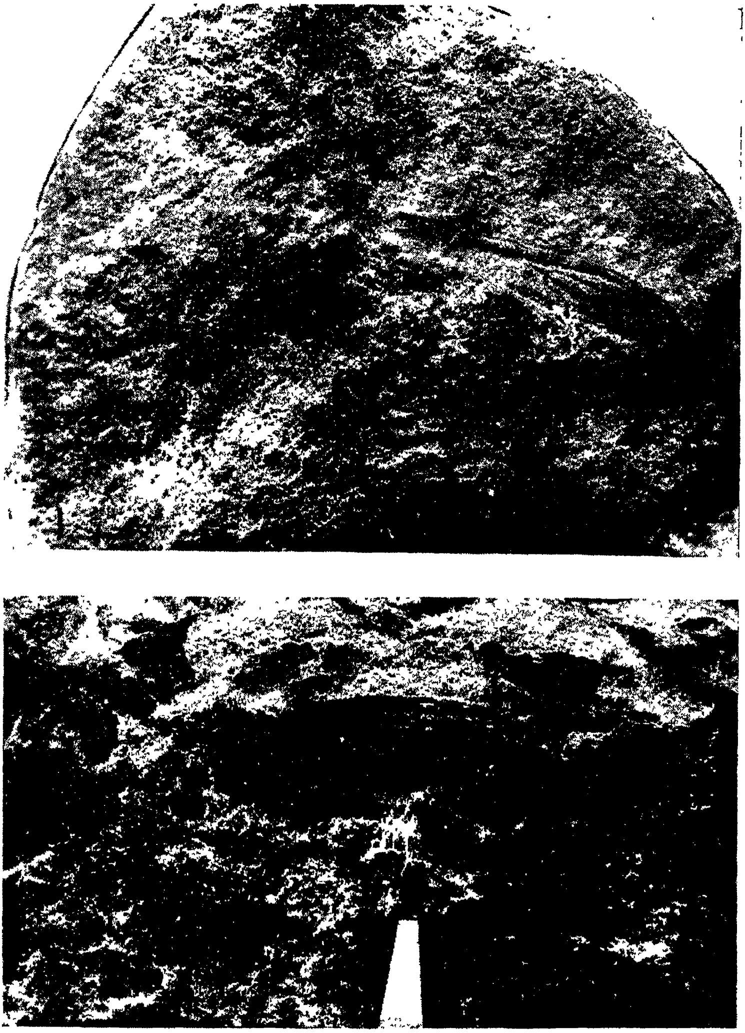
CARPENTER—PALAEDICTYOPTEROUS NYMPHS

EXPLANATION OF PLATE 7

Fig 1 Photograph of the type of *Insectorum* gen indet *anglicanum* Handl (U S Nat Museum, no 38109)

Fig 2 Photograph of the type of *Insectorum* gen indet *virginianum* Handl (U S Nat Museum, no 25635)

PSYCHE, 1948 VOL. 55, PLATE 7



CARPENTER—PALAEDICTYOPTEROUS NYMPHS

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CAMBRIDGE ENTOMOLOGICAL CLUB

A regular meeting of the Club is held on the second Tuesday of each month (July, August and September, excepted) at 8:00 p.m. in Room B–455, Biological Laboratories, Divinity Ave., Cambridge. Entomologists visiting Boston are cordially invited to attend.

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PSYCHE

VOL. 55 JUNE, 1948 NO. 2

LEPTINUS AMERICANUS LECONTE TAKEN ON A SHREW (COLEOPTERA-LEPTINIDÆ)

BY F. G. WERNER AND R. L. EDWARDS

Biological Laboratories, Harvard University

A fairly extensive literature has developed on the curious "mammal nest beetles" and their relationship with their hosts. Several cases have been recorded of beetles actually being taken in the fur of mammals and it is hoped that with the accumulation of data the significance of this occurence will become apparent.

One of the authors, Edwards, has taken these beetles several times in the fur of a shrew, *Blarina brevicauda talpoides* (Gapper). The animals had been caught in live-traps and the beetles were on them when they were examined for ectoparasites. The actual records are as follows: 2 ♀♀, 9-Mile Swamp, Hubbardsville, N. Y., 1 in Nov. and 1 in Dec., 1946; 1 ♂, 1 ♀, Lake Piseco, N. Y., May 3, 1947; 1 ♂, Murphy Woods, Hamilton, N. Y., June 3, 1947. No specimens were taken in the nests.

Mr. H. S. Barber, of the U.S.D.A. Division of Insect Identification, suggests that this is a case of phoresy, with the primary source of the beetles being the nest of another mammal, whose burrows the shrews had invaded. He gives three cases, in litt., where large numbers have been taken in the nests of moles and one in the nest of a bumblebee. Dury, 1892, tells of getting 107 specimens in a nest in which he had captured a specimen of *Blarina brevicauda*. The caption of his article is "What I found in the Nest of a Field Mouse" so there is some doubt as to the actual identity of the nest. Numerous European references to *Leptinus* mention mice, moles and shrews.

Others mention finding them in caves. As will be pointed out below, these do not refer to the same species as our *Leptinus*.

When the specimens were checked by Werner, the other author, it was discovered that there were significant differences between the series at hand and the specimens used in the figures of the European species by Jeannel and by Sharp and Muir. This led to closer examination. There is little if any difference in general appearance. The only discernible differences were the wider eighth antennal segment, which was narrower than the adjacent segments in *testaceus*, and the slightly wider clypeus. When the male genitalia were examined, it was found that great disparity exists. Our species has the parameres wider and with eight apical setæ in addition to the two long subapical setæ. Both Jeannel's and Sharp and Muir's figures of the male genitalia show only two long subapical setæ and some differences in general shape and proportion. Jeannel figures the tips of the mandibles as simple, while our species has the tips bifid. Two specimens dissected by Mr. Barber and kindly loaned for comparison, one from Barèges, Pyrénées, France, and the other from Torrington, England, have genitalic characters as in the figures of Sharp and Muir and of Jeannel. The mandibles of these specimens were not examined as this would entail further dissection of the specimens and placing the mandibles on a slide.

Since major differences in the genitalia usually are taxonomically significant, our *Leptinus* is surely different from *Leptinus testaceus* (Müll.). *Leptinus americanus* LeConte was described from Iowa. Unfortun-

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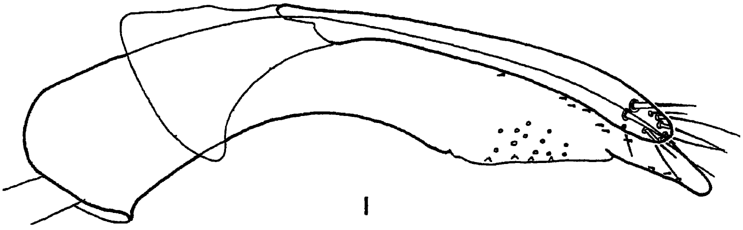
EXPLANATION OF PLATE 8

Leptinus americanus Lec.

Camera lucida drawings of New York specimens mentioned in the text. Figs. 3–5 from cleared specimens on slides, 1 & 2 from dissection of an alcoholic specimen. All deposited in M.C.Z.

Fig. 1.	Male genitalia, left lateral view, 238 ×.
Fig. 2.	Male genitalia, dorsal view, 238 ×.
Fig. 3.	Right antenna of female, dorsal view, 49 ×.
Fig. 4.	Dorsal view of head of female, 49 ×.
Fig. 5.	Tip of left mandible, ventral view, 382 ×.



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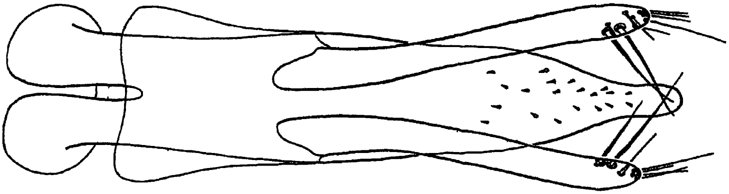

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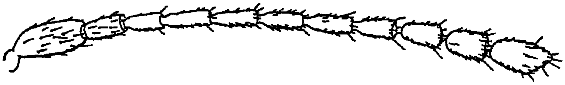

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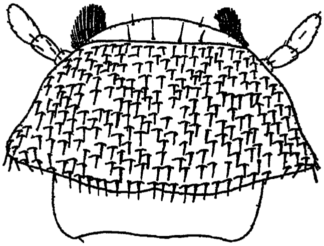

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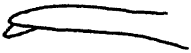

5

WERNER AND EDWARDS—LEPTINUS AMERICANUS

ately, all four specimens in the type series are females so that no check could be made of the male genitalia but the external characters check perfectly with the New York series. Undoubtedly, most or all of the specimens from eastern North America should be assigned to this species.

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SOME SPIDERS FROM ACAPULCO, MEXICO

By Elizabeth B. Bryant
Museum of Comparative Zoölogy

The Museum of Comparative Zoölogy has recently received two small collections of spiders made at Acapulco, by Dr. Harriet E. Frizzell in September 1940, of 4 species and a larger collection of 31 species by Dr. Sarah E. Jones taken in December 1944. Of these 35 species, 8 and an allotype are new. All of these are small and easily overlooked by the casual collector. It is a locality from which the Cambridges had little material when they wrote the two volumes of the Biologia Centrali-Americana, published in 1889–1905. In a short paper by Dr. W. J. Gertsch in 1907, several species from this locality were included but all were collected at a different season of the year.

The following is a list of the species found. All were collected in December with the exception of the four marked September.

Family Œcobiidæ

♂ ♀ *Œcobius beatus* Gertsch and Davis

Family Lycosidæ

♂ ♀ pullus *Sosippus mexicanus* Simon, Sept.

Family Sicariidae

pullus *Scytodes championi* F.O.P.-Cambr.
♀ " *hebraica* Simon

Family Pholcidæ

♂ ♀ *Physocylus globosus* (Tacz.)

Family Dictynidæ

♀ *Dictyna sp.*
♀ " *nivea* (O.P.-Cambr.)

Published with a grant from the Museum of Comparative Zoology at Harvard College.

Family Theridiidæ

♀ *Latrodectus mactans* (Fabr.)
♀ *Theridion maculipes* spec. nov.
♀ “ *placidum* spec. nov.

Family Linyphiidæ

♀ *Eperigone* ?

Family Argiopidæ

♂ pullus *Argiope* sp. Sept.
♂ ♀ *Aranea pallidulus* (Keys.)
♂ ♀ “ *vesta* spec. nov.
♀ *Eriophora edax* (O.P.-Cambr.)
♀ *Neosconella lineatipes* (O.P.-Cambr.)
♂ ♀ “ *oaxacensis* (Keys.) Sept.
♂ *Tetragnatha alba* F.O.P.-Cambr.
♂ ♀ “ *antillana* Simon
♂ ♀ “ *dentigera* F.O.P.-Cambr.
♂ ♀ “ *guatemalensis* O.P.-Cambr.
♀ pullus *Theridiosoma* ?

Family Thomisidæ

♂ *Misumenops celer* (Hentz)
2 ♂ ♀ pullus *Misumenops dubius* (Keys.)

Family Clubionidæ

♀ pullus *Anyphæna*
♀ *Anyphænella pavida* spec. nov.

Family Salticidæ

♂ ♀ *Habronattus cambridgei* spec. nov.
♀ *Marpissa melanognatha* (Lucas)
♂ ♀ *Metaphidippus gratus* spec. nov.
♂ “ *militaris* (Hentz)
♂ ♀ “ *purus* spec. nov.
♀ *Phiale simplicicava* (F.O.P.-Cambr.)
♀ *Plexippus fannæ* (Peckham)
♀ *Sidusa* ?
♂ *Tomis jonesæ* spec. nov.

Family Œcobiidæ

Genus *Œcobius* Lucas 1845

Œcobius beatus Gertsch and Davis

Figures 1, 2

Œcobius beatus Gertsch and Davis, 1937, p. 2, figs. 1, 2. "♀ holotype and immature paratypes from Acapulco, Mexico, June 17, 1936 (L. I. Davis)."

Male. Length, 1.5 mm.

The male is much darker than the holotype but the amount of color evidently depends upon the habitat. The eyes are more closely grouped than in the female and are on a low turret. The two black annulæ on each joint of the legs are reduced to large lateral dots. The abdominal markings are typical of the genus and are very distinct.

The palpus is large for the size of the spider. There are three conspicuous points all protruding from the cavity, a forked pair in the distal half and a longer point at the base. All are heavily chitinized.

Allotype ♂ Mexico; Acapulco, 19 December 1944 (S. Jones). 3♂ 5♀ Mexico; Acapulco, 18–19 December 1944 (S. Jones).

The male selected as an allotype was found under a rock and has the dark marks on the cephalothorax and the abdomen much more distinct than the specimens found at the base of palm leaves, these are quite pale.

Family Theridiidæ

Genus *Theridion* Walckenaer 1805

Theridion maculipes spec. nov.

Figure 3

Female. Length, 1.5 mm., ceph. 0.6 mm., abd. 1.1 mm. long, 1.0 mm. wide.

Cephalothorax pale, little darker about the eye area, anterior margin only slightly narrowed, cephalic portion little higher than the thoracic; *eyes* cover the anterior margin, anterior row recurved, a.m.e. dark, convex, separated by less than a diameter, a.l.e. smaller than a.m.e., separated from them by a radius of a.m.e., posterior row straight, eyes surrounded by red rings, p.m.e. larger than a.m.e., separated by less than a diameter, p.l.e. separated from p.m.e. by about a diameter of p.l.e., lateral eyes touching, p.l.e. larger than a.l.e.; *quadrangle* slightly higher than wide and about the same width in front as behind; *clypeus* higher than quadrangle; *mandibles* vertical, pale brown; *labium* dark, fused to the sternum, wider than long; *maxillæ* pale, more than twice as long as the labium, slightly inclined; *sternum* white, triangular, about as wide as long, ending in a truncate lobe between the fourth coxæ which are separated by fully a diameter; *abdomen* globose, pale, with no definite pattern, a small white inverted V at the base surrounded by black that quickly fades, dorsum with small chitinized dots that may be the bases of colorless hairs, venter a dull brown with an irregular median white spot; *legs* relatively short, 1–2–4–3, II left missing, white with broken dark rings at the tips of tibiae and metatarsi, no spines but rows of colorless hairs, most conspicuous on the anterior tarsi and metatarsi; *epigynum*, a pair of heavily chitinized round openings just above the fold that touch on the median line with larger and more widely separated sacs beneath the surface just anterior.

Holotype ♀ Mexico; Acapulco, 19 December 1944 (S. Jones).

Theridion maculipes is very small even for a *Theridion*. The most conspicuous characters are the white legs with the black dots and the black inverted V at the base of the abdomen. The openings of the epigynum are very distinct.

Theridion placidum spec. nov.

Figure 5

Female. Length, 2.6 mm., ceph. 0.9 mm., abd. 1.6 mm. long, 1.5 mm. wide.

Cephalothorax pale, cephalic portion slightly darker, shining, no hairs; *eyes* cover the anterior margin, anterior row slightly recurved, a.m.e. dark, separated by less than a diameter, convex, a.l.e. smaller than a.m.e., separated from them by about a radius of a.m.e., posterior row procurved, p.m.e. larger than a.m.e., separated by less than a diameter, p.l.e. separated from p.m.e. by a diameter of p.m.e., lateral eyes touching, p.l.e. slightly larger than a.l.e.; *quadrangle* higher than wide, same width in front as behind; *clypeus* vertical, and higher than quadrangle; *mandibles* vertical, pale, cone-shaped; *labium* pale; *maxillæ* twice as long as labium; *abdomen* globose, with a narrow median dark stripe with wavering margins outlined with a narrow pale stripe each side, in the emarginations a dark spot, three pairs in all, sides a dull tan, entire abdomen with scattered colorless hairs, venter pale; legs, 1–2–4–3, and I and II right legs missing, I pair much the longest, pale, femora and tibiæ slightly darker at the tips, rows of colorless hairs; *epigynum*, a pair of small dark circular sacs, fully two diameters above the fold, separated by a diameter and a half, with small oval openings beneath as figured.

Holotype ♀ Mexico; Acapulco, 19 December 1944 (S. Jones).

Undoubtedly *Theridion placidum* has been confused with *Theridion spiralis* Emerton. The latter is a common species in the northern part of the United States and has been reported by Keyserling from Venezuela and by Banks from Teapic, Mexico. Unfortunately a specimen of the Banks identification is not in the museum collection. A type specimen of *Theridion spiralis* Emerton from Essex, Massachusetts, which is now before me, has the median stripe on the abdomen pale, heavily outlined by a dark stripe; the epigynum is separated from the fold by less than a diameter and the lower margin of the area is chitinized and rolled outward.

Family Argiopidæ

Genus *Aranea* Linnæus 1756

Aranea pallidula (Keys.)

Epeira pallidula Keyserling, 1863, p. 124, pl. 4, figs. 14, 15. "♀ St. Fè de Bogota (N. Granada)."

Araneus pallidulus F.O.P.-Cambridge, 1904, 2, p. 514, pl. 49, fig. 13.

Keyserling described this species from a single female and states that it is 5.2 mm. long. Probably because of poor illumination or magnification, he failed to see the small scape in the middle of the epigynum. F.O.P.-Cambridge had the species from Panama and in the brief description mentions that it is 8.5 mm. long. He also had the type before him. It is a common species at Barro Colorado, Canal Zone, but all specimens seen are about 5.0–5.5 mm. long, so that the size mentioned by Cambridge is probably an error. Such a discrepancy in size is often misleading.

Aranea vesta spec. nov.

Figures 4, 6

Female. Length, 5.5 mm., ceph. 2.6 mm., abd. 3.5 mm. long, 3.5 mm. wide.

Cephalothorax dull yellow, paler on cephalic portion, anterior margin about half the greatest width, no thoracic groove, a pair of long colorless bristles at the end of the cephalic slope; *eyes* cover the anterior margin, both rows recurved, a.m.e. largest, separated by about a diameter with a pair of long colorless bristles between, each bristle from a distinct base, p.m.e. smaller than a.m.e., separated by more than a diameter with one long bristle between, lateral eyes subequal and touching; *quadrangle* wider in front and higher than wide; *clypeus* about a radius of a.m.e. with 6 or 8 long bristles on the margin; *mandibles* dull yellow, vertical, with scattered long colorless bristles, no boss, fang groove slightly oblique, upper margin with 4 teeth, lower margin with 3 smaller teeth; *labium* pale brown, wider than long, tip rebordered; *maxillæ* pale, twice as long as labium, sides parallel; *sternum* pale, triangular, three-quarters as wide as long, emarginate opposite the coxæ, pointed at the tip, fourth coxæ almost touching; *abdomen* as wide as long, but with no shoulder angles, a median pale area at the base which rapidly spreads to the width of the abdomen, on the distal half a median shield-shaped dark area, with emarginate sides, venter brown with two irregular pale spots anterior to the spinnerets; spinnerets dark, closely grouped very near the tip; *legs*, 1–2–4–3, femora dark brown, other joints much paler with faint darker bands near the tips, long black spines, no ventral spines on the femora, III and IV tibiæ with dorsal basal spine; *epigynum,* area wider than long, a pale broad median scape with a recurved spoon-shaped tip, base with several short dark bristles, each side of the median scape rather narrow plain areas with outer margins heavily chitinized; a lateral view shows the median scape curved outward.

Male. Length, 3.6 mm., ceph. 2.0 mm. long, 1.5 mm. wide, abd. 2.0. mm. long, 1.6 mm. wide.

Cephalothorax pale brownish-yellow, cephalic portion narrowed and rather high, faint thoracic groove on the posterior third, scar of a median bristle midway between eyes and groove; *eyes* same as in the female with scars of the two bristles between the a.m.e.; bristles on the margin of the clypeus as in the female; *abdomen* oval, about two-thirds as wide as long, white with a dark folium on the posterior two-thirds with the emarginate sides as in the female, venter pale brown, with a pair of very faint pale spots anterior to the spinnerets; *legs,* 1–2–4–3, II right missing, pale with vague broad dark bands at the base and tip of tibiæ, I and II coxæ with a small hook, no ventral spines on the femora, spines long and dark, I pair, tibia, ventral, 2–2–2, basal and median pairs very long, lateral, 3–3, dorsal, 1–1–1, metatarsus, ventral, 0, prolateral, 1, retrolateral, 2, II pair, patella, at the tip, 1 very long, 1 short, tibia, ventral, 3p short at the base, 2 at the tip, metatarsus, dorsal, 1 at the base, III and IV tibiæ, dorsal basal spine, IV femur near tip a retrolateral row of 6 slender spines, III femur, a retrolateral row of 3 very slender spines; *palpus* pale, patella, paracymbium abruptly recurved and the tip broad and bifid; the parts of the palpus best understood from the figure.

Holotype ♀ Mexico; Acapulco, 19 December 1944 (S. Jones). Allotype ♂ Mexico; Acapulco, 18 December 1944 (S. Jones). Paratypes 6 ♀ 8 ♂ Mexico; Acapulco, 18 December 1944 (S. Jones).

The generic position of *Aranea vesta* is very uncertain. It cannot be placed in the genus *Neosconella* F.O.P.-Camb. as it lacks ventral spines on the femora of both male and female. As the first coxa of the male has a hook, it cannot be placed in the genus *Metepeira* F.O.P.-Camb.

The epigynum agrees fairly well with the figure of *Aranea detrimentosa* (O.P.-Camb.) This species was described from both male and female but F.O.P.-Cambridge evidently decided that they were not of the same species and placed the male with *Epeira nigrohumeralis* O.P.-Camb. ♀ and never placed the female originally described under the name *detrimentosa*. The male of *A. detrimentosa* has one long bristle on the tibia and another from the patella of the palpus and the parts of the palpus are quite unlike those of *A. vesta*.

Genus *Eriophora* Simon 1864

Eriophora edax (O.P.-Camb.)

Figure 7

Epeira edax O.P.-Cambridge, 1863, p. 30. "♂ ♀ Rio de Janeiro, Brazil."

The specimen of *Eriophora edax* from Acapulco has a distinct tubercle above the spinnerets and the shoulder angles are slightly developed, both characters unlike the common *Eriophora balaustina* (McCook), found in Florida and Cuba. The abdomen is about 8.0 mm. long and the scape is 4.0 mm. The base is heavily chitinized and the tip extends beyond the base of the spinnerets. The species has been reported from various parts of Central America and from Puerto Rico.

Genus *Neosconella* F.O.P.-Cambridge 1903

Neosconella lineatipes (O.P.-Camb.)

Epeira lineatipes O.P.-Cambridge, 1889, p. 30, pl. 7, figs. 17, 18. "♀ ♂ Guatemala; road between Retalhulen and Mazatenango, Santa Ana, Guatemala City."

Epeira lineatipes Keyserling, 1892, p. 190, pl. 9, fig. 141.

Neosconella lineatipes F.O.P.-Cambridge, 1902, p. 476, pl. 45, figs. 5, 6.

This species is a little smaller than the one described by O.P.-Cambridge but it has the same spots and lines on the anterior pairs of legs, the mandibles and the cephalothorax. The figure of the epigynum given by O.P.-Cambridge is very misleading as the scape is turned back and it is not in a normal position. Keyserling has a much better description and the figures of the scape is in the normal position.

♀ Mexico; Acapulco, 18 December 1944 (S. Jones).

Family CLUBIONIDÆ

Genus *Anyphænella* Bryant 1931

Anyphænella pavida spec. nov.

Figure 12

Female. Length, 3.0 mm., ceph. 1.0 mm., abd. 2.0 mm.

Cephalothorax pale, slightly darker about the anterior margin, faint darker lateral stripes from the lateral eyes to the posterior margin, moderately convex, thoracic groove faint; *eyes*, anterior row straight, eyes subequal and equidistant, separated by about a radius, posterior row procurved, slightly longer than the anterior row, separated by more than a diameter; *quadrangle* higher than wide and wider behind than in front; *clypeus* about equals the diameter of a.m.e.; *mandibles* brown, vertical, rather long, fang groove transverse, impossible to see the teeth on the fang groove; *labium* gray, about as long as wide: *maxilla* pale, not twice as long as labium, sides parallel, not emarginate on the outer margins; *sternum* pale, nearly as wide as long, convex, widest between II coxæ, IV coxæ separated by less than a diameter; *abdomen* pale, shaded with gray in no definite pattern, convex, venter pale, opening of the posterior spiracle one third nearer the spinnerets than to the fold, spinnerets closely grouped; *legs*, I right missing, 1-4 2-3, very slender and frail, pale, I pair very long, I tibia, 1.4 mm. long, spines, ventral, 2-2, long and slender, lateral, 2-2, metatarsus, ventral, 2-2; *epigynum*, area almost twice as wide as long, all the parts beneath the surface deeply colored, a pair of large dark sacs just anterior to the fold, separated by fully a diameter with a notched margin between, in the anterior half and slightly closer together, a pair of oblique openings with chitinized margins and a darker point at the tip which may be the beginning of tubes.

Holotype ♀ Mexico; Acapulco, in palms, 18 December 1944 (S. Jones).

Anyphænella pavida is very delicate and fragile, so that it is impossible to count the teeth on the fang groove or the spines on the slender legs but the parts of the epigynum are very distinct. The spider has not oviposited.

Family SALTICIDÆ

Genus *Habronattus* F.O.P.-Cambridge 1901

Habronattus cambridgei spec. nov.

Figures 13, 15, 16

Habronattus viridipes F.O.P.-Cambridge, 1901, p. 224, pl. 21, figs. 4, 5, nec Hentz, 1846; nec *Pellenes viridipes* Peckham, 1885, 1900.

Male. Length, 4.5 mm., ceph. 2.5 mm. long, 1.5 mm. wide, abd. 2.1 mm. long, 1.6 mm. wide.

Cephalothorax dark chestnut brown, with a narrow band of white hairs above the anterior row of eyes and a few scattered white hairs in the ocular area and about the lateral margins, a dark triangle with the apex at the groove that extends to the posterior margin, cephalothorax fairly high, widest posterior to the dorsal eyes or between the second pair of legs, thoracic groove short in a circular depression between the dorsal eyes and midway in the cephalic plane, thoracic slope quite abrupt; *eyes*, anterior row recurved so that the upper margins form a straight line, a.m.e. touching, a.l.e. about one-half the diameter of a.m.e. and separated from them by a little more than a line, small eyes about midway between the first and third rows, dorsal eyes subequal with a.l.e.; *quadrangle* slightly wider behind than in front and about twice as wide as long; *clypeus* wanting below a.m.e. and no fringe on the margin; *mandibles* dark brown, vertical, long and narrow, fang groove very short, upper margin with three contiguous teeth, lower margin with one sharp tooth; *sternum* dark brown, oval, first coxæ separated by a diameter, fourth coxæ touching; *abdomen* discolored so that markings are obscured, venter brown, with lateral darker stripes; *legs*, 3–4–1–2, III pair not modified and no fringes on any leg, brown, with pale rings most conspicuous on the posterior pairs, I pair, femur, prolateral surface slightly flattened and covered with white scales, patella and tibia with many white scales, spines, patella, prolateral, 1, tibia, ventral, 2–2–2, metatarsus, ventral, 2–2, basal pair very long, II pair with area of white scales on femur smaller than on I pair, III and IV tibiæ with dorsal basal spine; *palpus* not as long as cephalothorax, femur and patella covered dorsally with white scales, tibia and tarsus pale brown, tibia not as long as patella, tibial apophysis dark, tarsus almost circular, bulb about circular, flattened, embolus from a distinct lobe of the bulb, starting about the middle on the outer side and ending in a very slender tube in a groove at the tip of the cymbium, the second process heavier, from just below the middle of the bulb, with an abrupt turn at the lower margin and ending about opposite the origin on the inner margin.

Female. Length, 5.1 mm., ceph. 2.4 mm. long, 1.7 mm. wide, abd. 2.5 mm. long, 1.7 mm. wide.

Cephalothorax pale brown, scantily covered with white hairs, darker about the eyes, moderately high, widest posterior to the dorsal eyes, thoracic groove short, in a circular depression about the middle of the cephalic area, thoracic slope concave; *eyes* as in the male; *mandibles* and *mouth parts* as in the male; *sternum* a pale brown, oval, first coxæ separated by more than a diameter, fourth coxæ touching; *abdomen* oval, dorsum flattened, pale, speckled with small patches of black hairs, venter pale outlined by a paler square; *legs*, 3–4–1–2, anterior pairs pale brown, on dorsal side, much paler on ventral, posterior pairs distinctly ringed on the dorsal side with dark and pale rings, ventral side pale; *epigynum* of the typical form with an oblique oval opening each side of a small triangle, posteriorly each side curved dark tubes with a small opening below the triangle as figured.

Holotype ♂ Mexico; Acapulco, 17 December 1944 (S. Jones). Allotyye ♀ Mexico; Acapulco, 17 December 1944 (S. Jones).

F.O.P.-Cambridge probably had this species which he identified in the Biol. Centr. America, as *Habronattus viridipes*, following the Peckhams identification of 1885 and 1900, of the Hentz species. Later in 1909, the Peckhams corrected their identification of *viridipes* Hentz and named the species found in Texas, *fallax*. A year latter, in 1910, Petrunkevitch in his catalogue, erroneously considered the Mexican species the same as *fallax* from Texas.

Habronattus viridipes (Hentz) has a heavy fringe of white hairs on the first pair of legs and the third patella is modified. *Habronattus fallax* (Peckham) has no fringe on the first pair of legs, the third patella not enlarged and the legs conspicuously ringed with white and black hairs. *Habronattus cambridgei* has no fringe on the first pair of legs, but the femur is slightly flattened and the area is covered with white scales; the cephalothorax is more slender than in the other two species and has a brush of white hairs above the first row of eyes and no white scales on the clypeus.

The female of *Habronattus cambridgei* is strikingly unlike the other species. Both *viridipes* and *fallax* have distinct abdominal patterns as in the males, while in *cambridgei* the abdomen has no dorsal pattern. The epigynum is typical of others of the genus.

Genus *Metaphidippus* F.O.P.-Cambridge 1903

Metaphidippus gratus spec. nov.

Figures 8, 9, 11

Male. Length, 5.4 mm., ceph. 2.5 mm. long, 2.1 mm. wide, abd. 5.1 mm. long, 1.6 mm. wide.

Cephalothorax chestnut-brown, with scattered iridescent white hairs, wide lateral stripes of white hairs from the a.m.e. that do not meet at the posterior margin, cephalic portion high, with a recurved shallow depression posterior to the dorsal eyes, then sloping gradually to the posterior margin, lateral margins rounded not parallel, thoracic groove short in the depression between the dorsal eyes; *eyes*, anterior row recurved, so that the upper margins of a.m.e. and the lower margins of a.l.e.

form a straight line, a.m.e. separated by little more than a line, and from a.l.e. by about a diameter of a.l.e., a.l.e. about a radius of a.m.e., second row of eyes one-third nearer anterior row than to dorsal eyes, p.l.e. not on the extreme margin of the carapace and subequal with a.l.e.; *quadrangle* slightly wider behind than in front; *clypeus* about wanting below a.m.e.; *mandibles* paler than cephalothorax, slightly divergent, basal third covered with long white hairs, only slightly narrower at the base than at the fang, fang groove with a blunt cusp on the upper margin, lower margin with a small sharp tooth opposite the cusp on the upper margin, fang a little longer than the groove; *labium* dark brown, longer than wide, tip rebordered; *maxillæ* brown, not twice as long as labium, upper outer angle produced in a slight lobe; *sternum* brown, longer than wide; *abdomen* oval, dorsum flat, a dark brown with wide lateral stripes of white hairs that do not meet at the base but join above the spinnerets, venter a paler brown; *legs*, 1–4–2–3, dark brown, I pair slightly enlarged, I femur with a retrolateral fringe of short white hairs, scattered white scales on tibia, other legs brown, with a few white hairs, spines, I pair, femur prolateral, 1, patella, 0, tibia, ventral, 2–2–2, all shorter than the diameter of the joint, the prolateral row extends to the middle of the joint, metatarsus, ventral, 2–2, II pair, spines the same as on I pair but smaller, few spines in III and IV pairs, no dorsal basal spine on III and IV tibiæ; *palpus* about as long as cephalothorax, femur slender, patella and tibia subequal, cymbium small and slender almost three times as long as as wide, tibial apophysis a slender straight spur, not as long as the diameter of the joint and parallel to the cymbium, bulb only slightly prolonged onto the tibia, embolus at the tip, a straight stout spur, abruptly narrowed near the tip.

Female. Length, 6.4 mm., ceph. 2.6 mm. long, 2.1 mm. wide, abd. 4.0 mm. long, 2.5 mm. wide.

Cephalothorax chestnut-brown, with scattered white hairs, no wide white marginal stripe as in the male and the sides not rounded, recurved shallow depression posterior to the dorsal eyes with the thoracic groove as in the male; *eyes* the same as in the male; *clypeus* as in the male, with a mass of white hairs beneath the a.l.e. and a fringe of white hairs on the margin; *mandibles* dark brown, basal half with a mass of white hairs, vertical, not narrowed at the base as in the male, fang groove almost horizontal, upper margin with a scopula of stiff hairs, lower margin with a sharp tooth; *labium* dark brown, longer than wide; no lobe on the maxillæ; *sternum* as in the male; *abdomen* pale, with a median dark stripe, heaviest on the posterior two-thirds, with the lateral margins broken by three pairs of spots covered with white hairs, the anterior pair at the first muscle spots, venter pale; *legs*, 1–4–2–3, III left missing, I pair slightly enlarged, dark with no rings, other pairs paler, III and IV pairs with faint dark rings at the ends of each joint, spines as in the male; *epigynum*, area wider than long, with a pair of oval, slightly oblique openings at the anterior portion, the median area convex and the posterior margin deeply edentate.

Holotype ♂ Mexico; Acapulco, 19 December 1944 (S. Jones). Allotype ♀ Mexico; Acapulco, 19 December 1944 (S. Jones).

Metaphidippus gratus is related to *Metaphidippus lanceolatus* F.O.P.-Cambridge, known only from the male, from Mexico and Guatemala, and also found by Dr. Chickering at Boquete, Pan. Rep., and identified by Mr. Banks from Costa Rica. Cambridge has figured three types of teeth on the fang groove, showing that the teeth are very variable in this species. The legs are described with dark and pale rings and the abdomen has white lateral stripes that meet at the base, the area between with paired dark spots. The Acapulco species is larger and darker than the specimens of *M. lanceolatus* from Costa Rica.

Metaphidippus purus spec. nov.

Figures 10, 14

Male. Length, 3.6 mm., ceph. 1.6 mm. long, 1.6 mm. wide, abd. 2.0 mm. long, 1.1 mm. wide, mand. 1.0 mm. long.

Cephalothorax a deep mahogany-brown, eyes on black spots, a narrow stripe of white hairs below the second eye row to near the posterior margin, this is not a marginal stripe, and a faint recurved cross bar of white hairs posterior to the dorsal eyes, a pair of dark spots in the middle of the eye area, many small white iridescent hairs on entire carapace, cephalic portion high and continued on the same plane halfway to the posterior margin when it falls abruptly, widest posterior to the dorsal eyes, lateral margins rounded, thoracic groove short; *eyes,* anterior row recurved, seen from the front, the upper margins of the eyes form a straight line, eyes equidistant, a.m.e. separated by little more than a line, a.l.e. less than a radius of a.m.e., eyes of the second row nearer the first than to the third row, dorsal eyes not quite on the extreme margin of the carapace; *quadrangle* slightly wider behind than in front; *clypeus* very narrow below a.m.e., with a fringe of white hairs on the margin; *mandibles* brown, shining, no hairs, slightly divergent, rounded and slender, only slightly wider at the base than at the tip, upper margin of the fang groove with one small tooth one-third from the base of the fang, lower margin with a much larger tooth or cusp near the base of the fang, fang long and sinuous; *labium* dark brown, longer than wide with a recurved tip; *maxillae* brown, twice as long as the labium, with upper outer angle produced in a short lobe; *sternum* brown, oval, convex; *abdomen* oval, a narrow lateral stripe of white hairs that do not meet at the spinnerets and is narrowly separated at the base, a pale middle stripe with darker stripes each side on the posterior half broken into four pairs of darker spots, scattered iridescent scales on the pale area, venter pale; *legs,* 1–4–2–3, II left missing, I pair enlarged, brown, with tarsus pale, femur flattened laterally, spines, patella, 0, tibia ventral, 2–2–2, prolateral row extends to about the middle of the joint, metatarsus, ventral, 2–2, II pair paler than the I pair, spines, patella, 0, tibia, ventral, 2–2–?, III and IV pairs with distal half of femur dark, no spines, I coxa brown, others pale and quite long; *palpus* longer than cephalothorax, femur curved, basal half pale with large white scales, patella longer than tibia, tibial apophysis a slender black spine parallel to the cymbium, bulb small, not extending onto the tibia, embolus a slender curved black spine at the tip of the bulb; both bulb and embolus may be somewhat distorted.

Female. Length, 4.4 mm., ceph. 2.0 mm. long, 1.6 mm. wide, abd. 2.6 mm. long, 1.6 mm. wide.

Cephalothorax the same as in the male, except that the recurved transverse bar of white scales is much heavier and the lateral stripe of white scales is quite short, a clavate bristle below the eyes of the second row; *eyes* same as in the male; *clypeus* the same as the male with a fringe of white hairs on the margin; *mandibles* dark brown, with white hairs, vertical, fang groove transverse, lower margin with a fissident tooth; *labium* and *maxilla* same as in the male, but no lobe on the upper outer angle; *sternum* dark brown, all coxæ pale; *abdomen* oval, dorsum flattened, with a pale median stripe that extends just beyond the middle, a dark basal spear-mark, either side the dark areas are broken into four dark spots as in the male, often with short cross bars of white scales separating the dark spots, venter pale with a large dark triangle in the center; *legs*, 1–4–2–3, shorter than in the male, I pair not enlarged, brown, tarsus and metatarsus pale, femur with a mass of white scales on the sides, spines, patella, 0, tibia, ventral, 2–2–2, metatarsus, ventral, 2–2, II pair, femur brown with long white hairs, tibia with a dark ring at the tip, other joints pale, spines, patella, 0, tibia, ventral, a prolateral row, 1–1–1, metatarsus, ventral, 2–2, III and IV pairs, pale with dark rings on femora and tibiæ, very few spines; *epigynum*, probably recently moulted as the parts are only lightly chitinized, on the anterior half a pair of large oblique oval openings, posterior margin deeply notched with a pair of small circular hyaline sacs each side.

Holotype ♂ Mexico; Acapulco, in lagoon on rubber trees, 18 December 1944 (S. Jones). Allotype ♀ Mexico; Acapulco, on rubber trees, 18 December 1944 (S. Jones). Paratypes, ♀♀ pullus, Mexico; Acapulco, on rubber trees, 18 December 1944 (S. Jones).

Metaphidippus purus is related to *Metaphidippus* *pernotus* (Petr.) *M. pernix*, *M. felix* F.O.P.-Camb., nec Peckham, from Guatemala but it lacks the large tooth on the upper margin of the fang groove and has but one small tooth instead of two teeth near the base of the same margin. The tibial apophysis is much longer on *M. [illegible]* and the median area of the dorsum is broken into four pairs of dark spots. The female of *M. pernotus* (Petr.) is not known.

Genus *Tomis* F.O.P.-Cambridge 1901

Tomis jonesæ spec. nov.

Figure 17

Male. Length, 5.1 mm., ceph. 2.5 mm. long, 2.0 mm. wide, abd. 2.6 mm. long, 1.6 mm. wide.

Cephalothorax chestnut-brown, ocular area covered with short white scales with a stripe on the median third of longer dark hairs that extends onto the clypeus, a broad marginal stripe of white hairs from the anterior eye row to the posterior margin and a small median spot of white hairs on the posterior slope of the cephalothorax, carapace rather high, sloping very gradually from the anterior eye row to halfway between the groove and the posterior margin where it falls abruptly, widest posterior to the groove, groove very short and in a circular depression; *eyes*, anterior row recurved, eyes very unequal in size, a.m.e. separated by little more than a line, and from a.l.e. by about double that space but less than a radius of a.l.e., small eyes midway between first and third rows, p.l.e. smaller than a.l.e. and not on the margin of the carapace; *quadrangle* narrower behind than in front and two-thirds as long as wide; *clypeus* about a radius of a.m.e., slightly retreating with a long median recurved bristle below a.m.e.; *mandibles* dark brown, vertical, rather small, fang groove transverse, upper margin with four small teeth, lower margin with no teeth, fang with a thick base; *labium* brown, longer than wide, tip pale and narrower than the base; *maxillæ* brown, not twice as long as the labium; *sternum* brown, flat, about two-thirds as wide as long, with many long hairs about the margins, fourth coxæ separated by about half a diameter; *abdomen* oval, brown, dorsum flat, clothed with brown and white hairs in no distinct pattern except for three dark chevrons on the distal half and large spots of white hairs each side, venter pale with many white hairs; *legs*, 4–1–2–3, pale, with rather vague darker rings on the tibiæ and patellæ, spines, I and II pairs, tibiæ, ventral, 2–2–2, metatarsi, ventral, 2–2, III and IV tibiæ, dorsal basal spine and median and apical whorls of spines; *palpus,* about as long as cephalothorax, brown, femur with a dorsal crest of white hairs, patella and tibia of about equal length, tibia about as wide as long with a retrolateral fringe of long white hairs and a prolateral brush of dark hairs so that the joint appears very broad, tibial apophysis a very slender dark shiny spur that extends beyond the middle of the cymbium, cymbium little longer than the tibia, embolus starts at the lower margin of the bulb, follows the contour of the cavity and ends as a slender free tip at the tip of the cymbium; in the bulb a conspicuous tube forms a U-shaped loop.

Holotype ♂ Mexico; Acapulco, on grass at beach, 18 December 1944 (S. Jones).

The genus *Tomis* was based by F.O.P.-Cambridge on a single species, *Tomis palpalis* F.O.P.-Camb. from Teapa, Mexico. *Tomis jonesæ* is separated from the genotype, by the slightly smaller size, the mass of short white hairs on the ocular area with the median stripe of longer dark hairs, the four teeth on the upper margin of the fang groove that are not grouped on a lobe or process as figured by Cambridge, and the U-shaped tube in the bulb of the palpus. Both species have the slender shining tibial apophysis and a very broad tibia of the palpus.

The stripe of black hairs on the ocular area is very conspicuous and if present on the genotype, would have been noted by F.O.P.-Cambridge.

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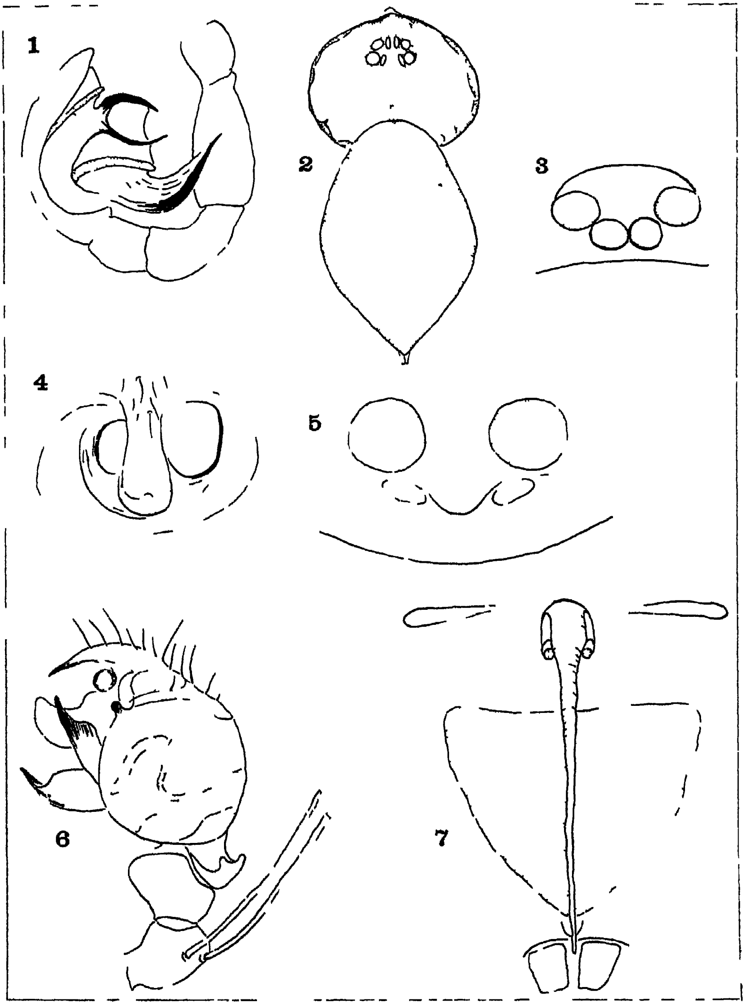
EXPLANATION OF PLATE 9

Fig. 1. ***Œcobius beatus*** Gertsch and Davis, left palpus.
Fig. 2. ***Œcobius beatus*** Gertsch and Davis, male, dorsal.
Fig. 3. ***Theridion maculipes*** spec. nov., epigynum.
Fig. 4. ***Aranea vesta*** spec. nov., epigynum.
Fig. 5. ***Theridion placidum*** spec. nov., epigynum.
Fig. 6. ***Aranea vesta*** spec. nov., left palpus.
Fig. 7. ***Eriophora edax*** (Blackw.), epigynum.

Psyche, 1948 Vol. 55, Plate 9

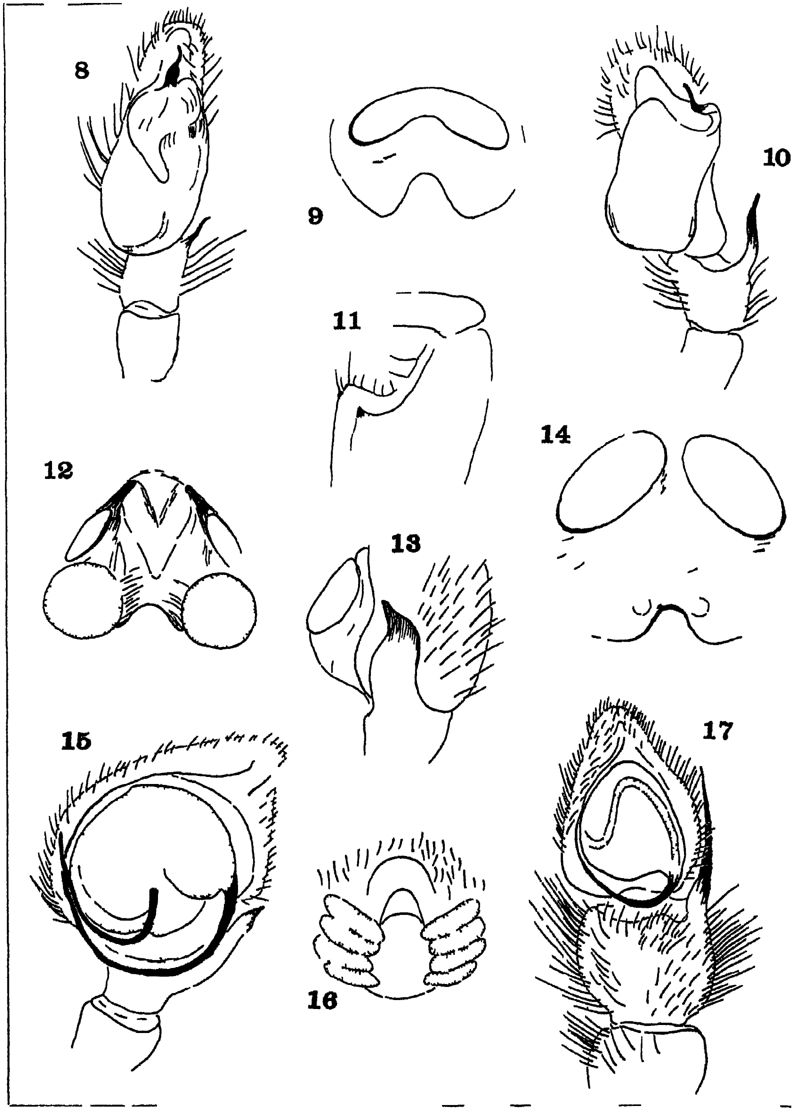


Bryant—Spiders from Mexico

EXPLANATION OF PLATE 10

Fig. 8. *Metaphidippus gratus* spec. nov., left palpus.
Fig. 9. *Metaphidippus gratus* spec. nov., epigynum.
Fig. 10. *Metaphidippus purus* spec. nov., left palpus.
Fig. 11. *Metaphidippus gratus* spec. nov., male, left mandible, ventral.
Fig. 12. *Anyphænella pavida* spec. nov., epigynum.
Fig. 13. *Habronattus cambridgei* spec nov., left palpus, tibial apophysis.
Fig. 14. *Metaphidippus purus* spec. nov., epigynum.
Fig. 15. *Habronattus cambridgei* spec. nov., left palpus, ventral.
Fig. 16. *Habronattus cambridgei* spec. nov., epigynum.
Fig. 17. *Tomis jonesæ* spec. nov., left palpus.

Psyche 1948 Vol 55 Plate 10



Bryant—Spiders from Mexico

A REDESCRIPTION OF THE TYPES OF *STRUMIGENYS MANDIBULARIS* F. SMITH, AND *CEPHALOXYS CAPITATA* F. SMITH

By Horace Donisthorpe, F.Z.S., F.R.E.S.
British Museum (Natural History), London

As my old friend the late Professor W. M. Wheeler once said to me, the Genus *Strumigenys* F. Smith much requires to be revised. This revision, I understand, is now being undertaken by Mr. W. L. Brown, Jr., at the Biological Laboratories, Harvard University. As F. Smith's descriptions of *Strumigenys mandibularis* and *Cephaloxys capitata* are quite inadequate for modern requirements; and as the rules of the British Museum do not allow types to be sent out of the Museum, I decided to redescribe the types of these two species. This I have done in the following short paper, which I trust will be of use to Mr. Brown in his revision of the genus *Strumigenys* F. Smith.

Strumigenys (*Strumigenys*) *mandibularis* F. Smith. ♀. Reddish brown, top of head blackish, the clypeus and base of lobes being reddish brown, first segment of gaster somewhat marked with black, eyes black, legs brownish yellow. *Head* triangular or cordate, narrowed in front, posterior border deeply excised, the excision being rounded, the posterior angles, consisting of two broad bluntly pointed lobes, separated by the excision, which are depressed above anteriorly, feebly longitudinally striate and very finely granulate, clothed with a number of very short and narrow adpressed glittering scale-like hairs; *mandibles* not very long (0.6 mm.), stout, inner border above armed with two blunt teeth towards the apex, apex armed with three teeth, the two outside ones long and pointed, crossing each other when closed, the one between them short and blunt; a row of blunt not very close spine-like outstanding hairs is arranged along the inner border and also between the apical teeth; ***clypeus*** large, rather flat, transverse anterior border rounded and furnished with a row of clubbed hairs, posterior border widely V-shaped, the furrow which separates it from the rest of the head rather deep; *frontal carinæ* forming the upper border of a rather deeply hollowed scrobe above the eyes; *eyes* large, round oval, *ocelli* small; *antennæ* six-jointed, fairly long; *scape* stout, curved, longer than the funiculus, very finely granulate, with a few adpressed short hairs on upper surface, anterior border with a row of longer and shorter not very close outstanding blunt spine-like hairs; *funiculus* covered with close adpressed silvery hairs pointing forwards, last two joints long and broader than those preceding, last joint pointed and longer than the two preceding taken together. *Thorax* stout, convex, very finely granulate; *pronotum* furnished with a neck anteriorly, transverse, posterior border semicircular, embracing the mesonotum; *mesonotum* large, prominent, about as long as broad, broadest just before base, posterior border almost straight, a very fine narrow suture separates it from præscutellum; *præscutellum* narrow, transverse, almost flat, separated from scutellum by a broad rounded suture which is deeper than that separating it from mesonotum; *scutellum* round oval, lozenge-shaped, transverse, somewhat prominent; *metanotum* very narrow, transverse, situated beneath scutellum; *epinotum* descending abruptly from beneath metanotum, armed with two short sharp teeth, space between the teeth somewhat hollowed out. *Petiole* with a long peduncle, and a node at apex rounded above and at sides, finely granulate; *post-petiole* finely granulate, broader than node of petiole, broadest at apex, rounded above and at sides. A white spongiform substance is present beneath the petiole and post-petiole and also along the junction between the petiole and post-petiole, and the post-petiole and gaster; *gaster* broadly oval, pointed at apex, broader in front than behind, broadest just before apex of first segment which is considerably longer than the rest of the gaster and very finely longitudinally striate. Rest of segments smooth and shining. Legs rather long, clothed with long decumbent glittering scale-like hairs. Long. 5 mm.

Redescription of F. Smith's type of *Strumigenys man-*

dibularis, a deälated female taken by Henery Walter Bates at St. Pawlo, Brazil.

F. Smith's original description may be found in the Journal of Entomology, 1862, vol. 1, pp. 72–73, pl. 4, figs. 6 and 7.

Strumigenys (*Cephaloxys*) *capitata* F. Smith

♀. Light brownish red; eyes, space between ocelli, and teeth of mandibles black. Head, thorax, and node of petiole finely granulate, declivity of epinotum, petiole, and gaster smooth and shining.

Head long triangular, or cordate, considerably narrower at apex than at base, broadest across ocelli, posterior angles rounded, posterior border moderately deeply excised; *mandibles* (only the left is present) rather short, pointed at apex, curved, the masticatory border armed with a row of small sharp teeth; *clypeus* almost as broad as long, somewhat flat, anterior and posterior borders rounded, furrows separating it from rest of head narrow but well marked; *frontal carinæ* forming the upper border of two rather deep scrobes above and ending beyond eyes; *eyes* fairly large, round oval, not very convex; *ocelli* small; *antennæ* six-jointed, scape curved, upper surface flat, not as long as funiculus; *funiculus* with last two joints long, but last joint pointed, and about as long as the preceding joints all taken together. *Thorax* longer than broad, but stout and convex; *pronotum* with a neck, anterior border rounded, anterior angles blunt, posterior border deeply excised embracing the mesonotum; *mesonotum* about as long as broad, narrower in front than behind, narrowed to apex, anterior border rounded, posterior border almost straight, a thin slightly raised line is present down centre of mesonotum; *præscutellum* very narrow, marked with short, not very close longitudinal ridges; *scutellum* fairly convex, transverse oval, anterior border almost straight, posterior border rounded, jutting out over metanotum and epinotum; *metanotum* very narrow and transverse, almost hidden beneath scutellum; *epinotum* armed with two short pointed teeth, dorsal surface transverse, somewhat flat, angle between dorsal surface and declivity abrupt, declivity longer than dorsal surface, somewhat concave. *Petiole* pedunculate, upper side of node transverse, flat, anterior border and angles rounded, sides and posterior border almost straight; *post-petiole* convex, broader than node of petiole, broadest before apex, sides rounded, upper surface somewhat convex, and very finely longitudinally striate at base; *gaster* long oval, pointed at apex, a row of short longitudinal striae are present at base of first segment which is considerably longer than the rest of the gaster. A white spongiform substance is present beneath the petiole and post-petiole, and at the junction of the same, and with the gaster. The whole body appears to have been clothed with short narrow scale-like hairs and scattered outstanding spine-like hairs, but many of the former, and most of the latter have apparently been rubbed off. *Legs* moderate. Long. 3 mm. Described from a single deälated female, the type of F. Smith's *Cephaloxys capitata* from New Guinea.

F. Smith's original description may be found in the Journ. Linn. Soc. Lond. Zool., 1864, vol. 8, p. 77, pl. 4, fig. 5. In the larger figure of the head, the antennæ are drawn with only five joints!

My best thanks are due to Professor G. D. Hale Carpenter for kindly lending me the type to redescribe.

A NEW SPECIES OF *CORYDALUS* (NEUROPTERA)[1]

By Nathan Banks
Holliston, Mass.

Corydalus ecuadorianus sp. nov.

Head and pronotum nearly black; meso-and metanotum rather paler, pleura nearly black; legs brown to yellowish brown, bases of tibiæ paler; abdomen black above, only a little paler beneath; antennæ black beyond the first few rufous joints; vertex with the smooth areas showing reddish as in *cornuta*, but reddish instead of yellowish; the smooth areas on pronotum, however, are scarcely paler than rest of surface.

Fore wing heavily marked with dark brown to black, much broken up by pale and whitish areas, rarely round, mostly irregular; cross-veins black; costal area brown on basal half, but each cell has some pale in it, beyond the costal area is largely pale with black cross-veins, some bordered; behind there are some pale spots in nearly every cell, the largest between the medius and its branch, and two pale bands in the cell behind it, two in radial area toward tip are also fairly large, and an elongate one in radial area beyond the first radial cross-vein; also one behind the origin of radial sector and reaching across the medius.

The hind wing is dark gray to brownish, but the apical half mostly brown, with black cross-veins, a square pale spot between second and third radial cross-veins, and a pale stretch in the subcostal area beyond, paler than in fore wing. Fore wing with about forty costals, in basal part several are curved, connected, or forked; the cross-vein from lower medius to cubitus is continuous with that from cubitus to cubital fork. In hind wing the first radial cross-vein (very oblique as in fore wing) ends at origin of second branch of radial sector, thus forming an X, and the second radial cross-vein does the same with the

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[1] Published with a grant from the Museum of Comparative Zoölogy at Harvard College.

fifth branch of radial sector (this doubtless varies, but not seen in any other species).

Mandibles of female short, stout, the teeth short and blunt, the tip, however, rather long and slender; the lateral carina back of antenna and eye is very indistinct; the margin of clypeus is scarcely produced in the middle, the lateral teeth being more prominent; the marginal tooth behind the eye is small and sharp; the posterior ocelli are nearly round and two diameters apart, anterior ocellus rather small; the pronotum is a little shorter than in many species, and not much broadened behind.

Length of fore wing 65 mm., width 19.5 mm.

One female from Banos, Ecuador, August (MacIntyre), Type M.C.Z. No. 26020.

A handsome species, and the first one from South America with the head-scars showing.

CONCERNING *ESURIS* BARBER (NOT STÅL) AND *NEOSURIS* BARBER, WITH A NEW SUBSPECIES FROM IDAHO. (HEMIPTERA-HETEROPTERA: LYGÆIDÆ)

By H. G. Barber
Roselle, N. J.

For an understanding of the sequence of the descriptions it is necessary to cite the complete bibliography for my genus *Esuris* (not Stål), with some added comments:

1911 *Esuris castanea* Barber, Jl. N. Y. Ent. Soc. XIX, 27 (brachypterous form, Arizona).
1916 Bergroth, Proc. Roy. Soc. Vict. (N. S.), Pt. I, 15 (foot-note), remarks that *Esuris castanea* Barber does not belong to Stål's genus *Esuris*. This reprint was not received until after the publication of the following 1918 articles.
1918 *Esuris fulgidus* Barber, Jl. N. Y. Ent. Soc. XXVI, 51 (brachypterous form, Arizona). Notes the discovery of the macropterous form of *castanea* and transfers it to the tribe Myodochini.
1918 *Esuris* Barber (not Stål), Psyche, XXV, 78. Keyed to the tribe Myodochini.
1924 *Neosuris* new genus, Barber, Jl. N. Y. Ent. Soc. XXXII, 133. Erected for *castanea*, but leaving *fulgidus* in Stål's *Esuris*.
1946 Bueno, Entom. Amer. XXVI (N. S.), 68. Correctly placed both *castanea* and *fulgidus* in the genus *Neosuris*.

Genus *Neosuris* Barber 1924

Head much wider than long, imbedded nearly to the eyes; eyes mediocre, not strongly protruding; preocular portion of head subequal to the length of an eye; antenniferous tubercles very short; ocelli obsolete. Antennæ lightly incrassate, basal segment short, barely surpassing apex of tylus, second but little longer than third. Rostrum extended to the intermediate coxæ; basal segment not quite reaching base of head. Pronotum somewhat longer than wide; lateral margins neither carinate nor impressed beneath; constriction between the two lobes shallow; anterior lobe but little wider than head across the eyes; posterior lobe not depressed, much shorter and subequally as wide as anterior lobe; anterior margin straight; posterior margin very slightly concavely arcuate. Scutellum flat, but little wider than long. Corium and clavus connate, in the same plane, the latter with three rows of punctures; corium very finely pilose, posterior margin straight, devoid of a membrane. The two trichobothria of the third visible ventral segment widely separated. Anterior femora strongly incrassate, with very few small spines beneath. Anterior tibia curved, finely serrate within. Pterygo-dimorphic.

Type: *Neosuris castanea* Barber.

The genus *Neosuris* was never adequately described. The character of the genus was indicated in the description of the brachypterous form of what at the time I mistakenly placed in Stål's genus. Not until 1918 was the macropterous form from the same locality recognized.

Macropterous form: Color fusco-castaneous, anterior and posterior margins of the pronotum and the clavus paler. Character of the head and antennæ as in the brachypterous form. Ocelli present, situated close to the eyes. Pronotum over one third wider than long, the constriction between the two lobes shallow; anterior lobe just over twice as long and about one fourth narrower than the posterior lobe; anterior margin straight; posterior margin very gently concavely arcuate; lateral margins neither carinate nor narrowly impressed beneath; anterior lobe finely closely punctate; posterior lobe more sparsely and coarsely punctate; narrow posterior margin impunctate. Scutellum one fifth wider than long, rather closely punctate, faintly carinate towards apex. Commissure one fourth shorter than the scutellum. Clavus with three regular rows of punctures. Corium sparsely, finely pilose, rather closely and coarsely punctate. Membrane hyaline, extended to apex of the abdomen. Venter finely pilose. Length 2.70 mm.

Neosuris apparently is most closely related to *Valonetus* Barber. In which case both of these genera should be assigned to Stål's tribe Rhyparochromini rather than to Myodochini where I placed them in my 1918 synoptic key.

Neosuris castanea fraterna, new subspecies

In both the brachypterous and macropterous forms the head and pronotum are more sparsely punctate than in the typical form and the clavus and corium somewhat more coarsely punctate. Although the colors tend to vary in this subspecies several specimens in the series are considerably darker than normal. Described from 25 specimens.

Type male (brachypterous); Kendrick, Idaho, August 13, 1938 (Professor H. M. Harris collection). Paratypes: 15 males and 9 females, all with the same data as the type. Two of the females are macropterous. One pair retained by the author.

Neosuris fulgida (Barber)
Esuris fulgidus Barber, Jl. N. Y. Ent. Soc., XXVI, 1918, 15.

Quite distinct from *castanea* by reason of the striking difference in color and punctation. Besides the difference in color and its polished aspect, the head pronotum and the scutellum are smooth and very nearly impunctate. Clavus and corium connate with no indication of a claval suture. Five rows of punctures parallel the lateral margin of the scutellum.

Only two specimens, both of the brachypterous form, have been seen. It is quite possible that with the discovery of the macropterous form it will be found that a new genus may have to be established to contain it.

FOUR NEW PERUVIAN CHIGGERS (ACARINA-TROMBICULIDÆ)[1]

By G. W. Wharton
Department of Zoölogy, Duke University

The specimens on which this paper is based were collected by O. P. Pearson and were obtained through Charles Remington from Harvard's Museum of Comparative Zoölogy. Their courtesy in transmitting the specimens is greatly appreciated. The records of the hosts from which these chiggers were removed were provided by O. P. Pearson.

Six species of chiggers have previously been reported from Peru: *Crotiscus thomasi* (Oudemans, 1910);[2] *Megatrombicula peruriana* (Ewing, 1929); *Odontacarus australis* Ewing, 1929; *Trombicula shannoni* Ewing, 1929; *Trombicula japa* Ribeyro and Bambaren, 1922; and *Eutrombicula alfreddugèsi tropica* (Ewing, 1928). The present paper increases the list to ten. Of the six species previously reported *Megatrombicula peruriana* is known only as an adult while *Trombicula japa* cannot be identified on the basis of available information and will probably have to become a species *incertæ sedis*.

While preparing this paper particular attention has been given to the modified setæ of the legs. Wharton 1947 and 1947a has shown that the chætotaxy of the legs is an important aid to the taxonomic study of larval trombiculids. As more and more species are studied, it becomes increasingly obvious that it is desireable to name these setæ. Grandjean 1935 worked out a system of nomenclature for the modified setæ on the last three segments of the legs of oribatid mites. However, his system applied to all instars and so cannot be readily modified to fit the present case. Nesbitt 1945 has named the setæ on the tarsi of acarid mites and has thus been able to simplify their description.

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[1] This paper is the result of work done in connection with research supported by a grant-in-aid from the Research Grants Division of the U. S. Public Health Service and is published with a grant from the Museum of Comparative Zoölogy at Harvard College.

[2] New combination based on unpublished work by H. S. Fuller.

In the trombiculid mites four types of modified setæ are found on the legs and palps as follows:

1. Blunt striated sensory setæ—one on the dorsal side of each tarsus of the first two pairs of legs and one at the base of the palpal tarsus on the ventral surface.
2. Pointed striated sensory setæ—on the genua and tibiæ of all leg, the tarsus of leg I, and the pretarsi of legs I and II. There may be on one tarsus III and the palpal tarsus, but this is unusual.
3. Microsensory setæ—may be present on the genua, tibiæ, and tarsi of legs I and II.
4. Whip-like setæ—one or more may be present on telofemur, genu, tibia, and tarsus of leg III.

Unfortunately these setæ are not all constant in their positions on the legs but may vary from species to species. It is therefore impossible to name them on the basis of location. One solution to the problem is to name the fixed setæ while reserving fluid terms for the others. The following system is suggested.

spur = blunt striated sensory seta on the tarsus. (The use of the term spur for this seta is adopted from Brennan 1947, Ewing in many papers has referred to this seta as the dorsal spine, but since it is usually rounded at its tip, Brennan's term is to be preferred.)

pretarsala = the striated sensory seta on the pretarsus.

subterminala = the pointed striated sensory seta on the dorsal prominence of tarsus I. (The term subterminal is taken from Ewing 1931.)

parasubterminala = a microsensory seta associated with the subterminal seta.

microspur = a microsensory seta close to the spur or situated between the spur and the subterminal seta.

tibiala = a pointed striated sensory seta on the tibia.

microtibiala = a microsensory seta on the tibia.

genuala = a pointed striated sensory seta on the genu.
microgenuala = a microsensory seta on the genu.
mastitarsala = a whip-like seta on the tarsus.
mastitibiala = a whip-like seta on the tibia.
mastigenuala = a whip-like seta on the genu.
mastifemorala = a whip-like seta on the femur.

By combing the names of the setæ as given above with the appropriate Roman numeral to indicate the leg on which the seta or setæ are found the statement, "three whip-like setæ on tarsus III" can be reduced to "three mastitarsalæ III", or the statement," a blunt striated sensory seta on tarsus I" can be reduced to "spur I." A second and perhaps more important reason for naming

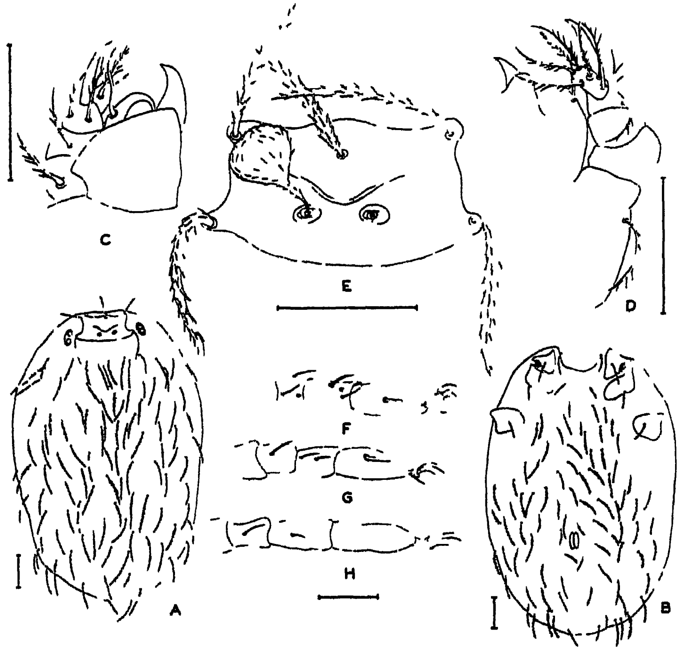

Fig. 1. *Euschongastia phylloti* n. sp. A, dorsum; B, venter; C, dorsal view of gnathosoma; D, ventral view of gnathosoma; E, scutum; F, leg I with specialized setæ of genu, tibia, tarsus, and pretarsus; G, similar view of leg II; G, similar view of leg III. (Magnification of each figure, indicated by the line associated with the figure, represents 50 microns.)

the modified setæ on the legs is that it will call attention to their presence and importance in the descriptions of trombiculid larvæ. A nameless structure is more likely to be ignored than one for which a name is available.

The above system of nomenclature will be adopted in describing the four species included in this paper. Special drawings of the legs (Figure I) have been made so that the modified setæ can be shown in detail.

Euschöngastia phylloti n. sp.

Body: Oval in shape, 560 microns long and 360 wide, striæ over entire surface. A pair of subequal eyes with well developed corneas on each side of the body at the level of the posterior lateral scutal setæ. Eyes about 15 microns in diameter. Anal opening ventral.

Gnathosoma: Chelicerae stout, basal segments with angular lateral expansions, distal segment with a hyaline tip that bears a dorsal tooth, a minute ventral tooth, and a pointed apex. Palpal segment 1 with a feathered seta; 2 with a feathered seta; 3 with a seta that is nude or branched; 4 with a dorsal and ventral setæ feathered and lateral seta nude or branched, palpal claw with two small dorso-lateral tines and one large median tine; 5 with a spur, 5 ventral feathered setæ, and one dorsal feathered seta. Galeal seta nude. No stigmata or tracheæ present.

Legs: Coxæ I and II contiguous, coxa III about its own length posterior to coxa II. All coxæ with a single seta except the right coxa of specimen #540–2 which has two setæ. Sensory setæ on legs as follows:

I—2 genualæ, 1 microgenuala, 2 tibialæ, 1 microtibiala, 1 spur, 1 microspur lateral to the spur, 1 subterminala, 1 parasubterminala, and 1 pretarsala.

II—1 genuala, 2 tibialæ, 1 spur, 1 microspur posterior to the spur, and 1 pretarsala.

III—1 genuala and 1 tibiala.

Each leg terminates in a pair of tarsal claws that are lateral to a medium longer and thinner claw-like empodium.

Scutum. Roughly rectangular with punctate ornamentation. A definite V-shaped ridge anterior to the pseudostigmata. Posterior lateral setæ on lateral projections of the scutum. Scutal setæ stout and feathered. Sensillæ globose with fine setules over entire surface except on basal portion of stem. The Standard Data (Wharton 1946) follow:

Specimen	AW	PW	SB	ASB	PSB	AP	AM	AL	PL	S
54-1	79	103	20	30	21	45	55	69	75	2
621-6	69	99	19	31	22	33	55	62	62	2
621-8 Type	76	90	21	28	18	32	50	62	54	37
621-9	66	88	20	27	14	27	46	62	62	27
621-1	69	88	18	29	20	29	44	60	62	
Mean	72	91	19	29	19		50	63	63	30

Setæ. Dorsal setæ feathered about 55 microns long and arranged in indistinct rows, about 100 setæ in all. Humeral setæ not distinctly set off from other dorsal setæ. Sternal setæ feathered, 2 pairs between coxæ I and II, about 40 microns long. Approximately 60 ventral setæ arranged in indistinct rows from between coxæ III to the posterior end, feathered, and about 50 microns long.

Material. The following specimens all collected by O. P. Pearson at Caccachara, 50 miles S. W. of Ilave, Peru were studied:

[illegible] #	*Host*	*Date*	*Number of Specimens*
740	*Phyllotis darwini*	5 October 1946	2
47	*Chinchillula sahama*	7 October 1946	1
21	*Phyllotis darwini*	22 October 1946	1 Type (MCZ No. 026)

Diagnosis. Euschongastia phylloti can be readily recognized in that it differs from other members of the genus as here interpreted in having the ventral setæ extend anteriorly between coxæ III.

Remarks: Ewing restricted the genus Euschongastia to species with more than three prongs on the palpal claw, and erected the genus Ascoschongastia to include similar specimens with two or three prongs on the palpal claw. The type species of Ascoschongastia however has only three setæ on the scutum instead of five. It seems more desireable at present to expand the meaning of Euschöngastia to include *E. phylloti* than to erect a new genus or to accept Ewing's interpretation of Ascoschöngastia.

Trombicula pearsoni n. sp.

Figure 2

Body: Oval, 350 microns long by 250 meirons wide, striæ fine anteriorly coarser posteriorly, eyes opposite posterior lateral scutal setæ, anterior eyes larger 18 microns, posterior eyes 15 microns, both eyes on an indistinct ocular plate, anus ventral more than its own length from the posterior end in a partially engorged specimen.

Gnathosoma: Chelicerae with rounded basal segments that are longer than the narrow dorsally curved distal segments. Each distal segment with a tricuspid cap, one tooth dorsal, one ventral, and one apical. Palpal segments evenly rounded laterally; segment 1 with a feathered seta; 2 with a feathered seta; 3 with a feathered seta with fewer barbs than seta on 2; 4 with a nude dorsal seta, a branched lateral seta, and a feathered ventral seta. Palpal claw with two small outer prongs and a large median prong. Palpal segment 5 with a basal spur and seven feathered setæ. Galeal seta nude or with one or two barbs. No stigmata or tracheæ present.

Legs: Coxæ in partially engored specimens nearly contiguous. Each coxa with a single feathered seta. Sensory setæ on legs as follows:

I—a microgenuala between a pair of genulæ, a microtibiala lateral to the posterior of two tibialæ, a microspur anterior to the spur, a subterminala and parasubterminala that arise from a single base, and a pretarsala.

II—one genuala, 2 tibialæ, a microspur posterior to the spur, and pretarsala.

III—one genuala and one tibiala.

Each leg is terminated by a pair of curved claws that arise on the lateral tip of the pretarsus. A thin claw-like empodium is present between the claws.

Scutum: The scutum is roughly pentagonal, and is completely covered by small, numerous, punctæ. The pseudostigmata are small and each has a short slit in front of it about equal to its diameter. Sensillæ are long filiform and have a few barbs on the distal two-fifths.

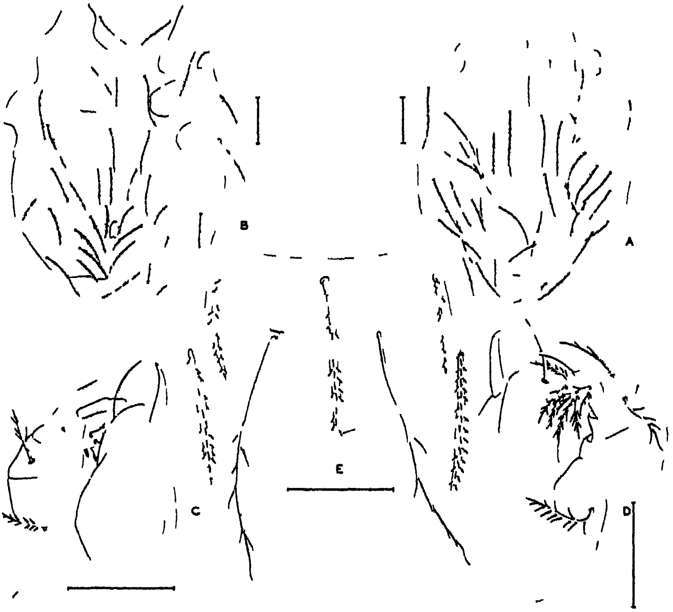

Fig. 2. *Trombicula pearsoni* n. sp. A, dorsum; B, venter; C, dorsal view of gnathosoma; D, ventral view of gnathosoma; E, scutum. (Magnification of each figure, indicated by the line associated with the figure, represents 50 microns.)

The scutal setæ are covered with short barbs. The Standard Data follow:

Specimen	AW	PW	SB	ASB	PSB	AP	AM	AL	PL	S
Type	86	118	47	52	40	54	72	51	66	97
456–1	94	117	46	41	46	48	63	48	69	
456–2	90	114	50	39	43	41	72	60	69	93
Mean	90	116	48	44	43	48	69	53	68	95

Setæ: The dorsal setæ are similar to the scutal setæ. They are about 85 microns long and are distributed in transverse rows from anterior to posterior as indicated below. The anterior ventral setæ, including the sternal setæ, differ from the dorsal setæ in that their barbs are slightly longer and arise from only two lines along the shaft rather than all over the shaft. The arrangement in indefinite rows is given below.

Specimen	Dorsal setæ	Ventral setæ	Total
Type	2-8-5-8-4-6-4 + 9	2-2 + 16	66
456-2	2-6-2-8-7-7-4 + 14	2-2 + 16	70
456-1	2-8-6-8-6-8 + 18	2-2 + 18	78

Material: These specimens were collected by O. P. Pearson at Caccachara, 50 miles S.W. of Ilave, Peru, at an elevation of 16,000 feet.

O. P. Pearson's #	*Host*	*Date*	*Number of Specimens*
456	*Punomys lemminus*	13 September 1946	2 + Type (MCZ No. 3027)

Diagnosis: Trombicula pearsoni can be distinguished from other members of the genus because while it has a pentagonal scutum it lacks whip-like setæ on the third legs. In these characteristics it is similar to *Trombicula biops* n. sp. but can be distinguished from it most readily on the basis of the feathered dorsal seta on the palpal tibia in *T. biops*. as opposed to the nude seta found in this position in *T. pearsoni*.

Remarks: This species is named for the collector O. P. Pearson.

Trombicula biops n. sp.

Figure 3

Body: Elongated 462 microns by 200 microns, striæ well developed, eyes two on either side at the level of the posterior lateral setæ. No ocular plate present. Diameter of anterior eye 10 microns, posterior eye 8 microns. Anus about twice its length from the posterior end on the ventral side.

Gnathosoma: Basal segments of cheliceræ weakly angular laterally, distal segments short with tricuspid cap. Palpal segment 1 with a feathered seta; 2 with a feathered seta; 3 with a feathered seta; 4 with two branched setæ and a ventral feathered seta, palpal claw with two small subequal dorso-lateral prongs and a stout longer median prong; segment 5 with one spur, 2 basal and 3 apical feathered setæ, and a large feathered dorsal seta. Galeal seta nude. No stigmata or tracheæ present.

Legs: Coxæ I and II contiguous, III separated by its own width from II. All coxæ with a single feathered seta. Leg I with a pair of genualæ with a microgenuala between them; two tibialæ in tandem with a microtibiala between them; a spur with a microspur half the length of the spur anterior to the base of the spur; subterminala with small parasubterminala arising from an independent setal base; one pretarsala. Leg II with one genuala, two tibialæ, a spur and microspur, and pretarsala. Leg III with a

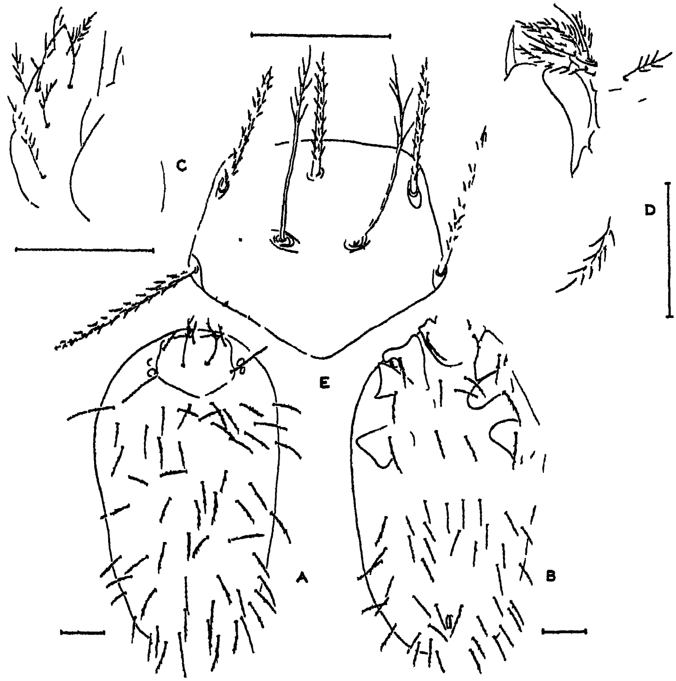

Fig. 3. *Trombicula biops* n. sp. A, dorsum; B, venter; C, dorsal view of gnathosoma; D, ventral view of gnathosoma; E, scutum. (Magnification of each figure, indicated by the line associated with the figure, represents 50 microns.)

genuala, a tibiala, but no whip-like setæ. Each leg is terminated by a pair of lateral ambulacral claws that flank a median longer and thinner claw-like empodium.

Scutum: The scutum is definitely pentagonal in shape. It is ornamented by closely set, irregularly placed punctæ. The pseudostigmata are small and bordered by short anterior and posterior ridges. The sensillæ are peculiar in that they have extremely short fine barbs along their entire length. The scutal setæ are provided with short barbs over their entire surface. The Standard Data follow:

Specimen	AW	PW	SB	ASB	PSB	AP	AM	AL	PL	S
Type	70	86	28	35	41	30	48	40	59	72
508–1	69	90	25	35	39	29	46	44	62	83
508–2	70	89	28	35	36	26	41	39	57	75
508–4	72	91	26	35	36	31	48	35	58	76
540–2	67	79	26	28	29	25	35	29	47	
Mean	70	87	27	34	36	28	44	37	57	77

Setæ: Dorsal and ventral setæ similar to scutal setæ about 40 to 50 microns long. Dorsal setæ irregularly arranged. A pair of humeral setæ present followed by an irregular band of about 16 setæ, behind these anterior dorsal setæ there are about 40 posterior dorsal setæ. The ventral setæ are arranged in more definite rows than the dorsal setæ but they are also too irregular to permit a setal formula. Two pairs of sternal setæ in all eight specimens examined but the type is unusual in that it bears an extra median seta between the first pair of sternal setæ. Posterior to the last pair of coxæ there are about 40 setæ arranged in irregular rows.

Material: Collected by O. P. Pearson at Caccachara, 50 miles S.W. of Ilave, Peru, at an altitude of 16,000 feet.

O. P. Pearson's #	*Host*	*Date*	*Number of Specimens*
508	*Phyllotis bolivensis*	28 September 1946	5
540	*Phyllotis darwini*	5 October 1946	2 + Type (MCZ No. 3029)

Diagnosis: As mentioned under the discussion of *Trombicula pearsoni*, *T. biops* is morphologically similar to it. *T. biops* can be separated from *T. pearsoni* on the shape

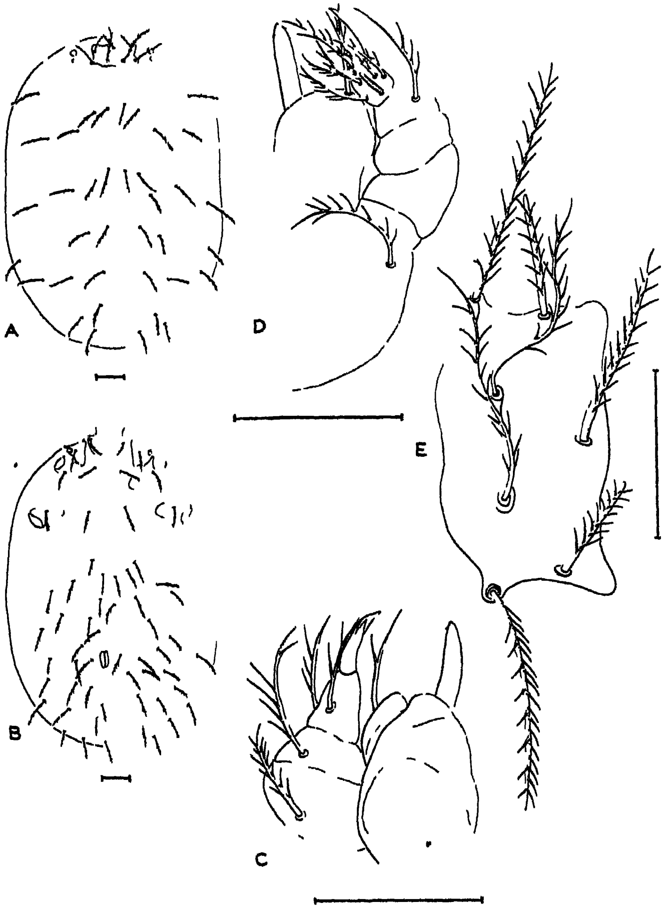

Fig. 4. *Trombicula chara* n. sp. A, dorsum; B, venter; C, dorsal view of gnathosoma; D, ventral view of gnathosoma; E, scutum. (Magnification of each figure, indicated by the line associated with the figure, represents 50 microns.)

of the scutum, absence of ocular plates, size of the subterminalæ, and arrangement of the body setæ as well as by the difference noted under the discussion of *T. pearsoni.*

Remarks: The sensory setæ and sensillæ of this species are so different from those of other species that have been studied in this respect, that it is difficult to know just how *T. biops* is related to other species.

Trombicula chara n. sp.

Figure 4

Body: An enlongated regular oval 625 microns long by 400 microns wide. Striæ weak. Eyes distinctly separate; anterior eyes 8 microns in diameter, posterior eyes 6 microns. Anus ventral and relatively far anterior, 170 microns from the posterior end.

Gnathosoma: Cheliceræ with rounded basal segments, and short strongly curved distal segments each of which terminates in a typical tricuspid cap. Palpal segments 1 and 2 with feathered setæ; segment 3 with a branched seta; the three setæ on segment 4 branched, palpal claw with two subequal dorso-lateral tines and a longer median ventral prong; segment 5 with a basal spur and seven feathered setæ, one dorsal, two apical, and four ventral. Galeal seta branched. No stigmata or tracheæ present.

Legs: Coxæ I and II contiguous, coxa III separated by its own length from coxa II. All coxæ with a single feathered seta. Leg I with three genualæ, one microgenuala, two tibialæ, one microtibiala, one spur, one microspur at the tip of the spur, one subterminala and one parasubterminala arising from the same base, and one pretarasala. Leg II with one genuala, two tibialæ, one spur, and a pretarsala. Leg III with one genuala, one tibiala, and one mastitarsala. All legs terminate in a pair of claws and a median claw-like empodium.

Scutum: Irregularly shaped with a sinuous posterior margin. Punctæ scattered over entire scutum except on anterior lateral angles. Pseudostigmata simple pits. Sensillæ filiform with many branches extending almost to their base Scutal setæ with numerous barbs that arise from one face. Anterior lateral setæ set back from the anterior lateral margins of the scutum. The Standard Data follow:

Specimen	AW	PW	SB	ASB	PSB	AP	AM	AL	PL	S
Type	72	83	28	32	17	20	55	35	69	76
508–1	72	79	30	28	15	21	54	36	70	76
510–1	76	87	30	30	18	21	55	33	72	71
510–6	72	87	30	28	18	19	41	35	62	
510–9	75	83	30	30	18	19	55	32	69	72
Mean	73	84	30	30	17	20	52	34	68	74

Setæ: The dorsal and ventral setæ are similar to the scutal setæ. The dorsal setæ are about 60 microns long while the ventral setæ are about 50 microns. The dorsal setæ are arranged in fairly regular rows. The type has a dorsal setal formula as follows: 2–8–9–6–6–4–2. The other specimens have a less regular arrangement that begins 2–10. The ventral setæ consist of two pairs of sternals and about fifty setæ posterior to coxæ III.

Material: All specimens were collected by O. P. Pearson at Caccachara, 50 miles S.W. of Ilave, Peru, at 16,000 feet.

O. P. Pearson's #	*Host*	*Date*	*Number of Specimens*
508	*Phyllotis boliviensis*	28 September 1946	4
510	*Phyllotis darwini*	5 October 1946	11 + Type (MCZ No. 3028)

Diagnosis: Trombicula chara can be readily recognized from previously described species of Trombicula in that it lacks a pentagonal scutum but does have a mastitarsala on leg III.

Remarks: The types of *T. chara* and the other new species described, as well as half of the other specimens, will be returned to the Museum of Comparative Zoölogy at Harvard. One specimen of *Euschöngastia phylloti, Trombicula biops*, and *Trombicula chara* will be sent to the U. S. National Museum; a similar series will be deposited at the U. S. Public Health Laboratory in Hamilton, Montana; one specimen of *Euschögastia phylloti* and one of *Trombicula chara* will be sent to the South Australaian Museum; and the remainder will be retained at Duke University.

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A PERMIAN INSECT FROM TEXAS

By F. M. Carpenter
Harvard University

The specimen described below was sent to me several years ago by Mr. Charles B. Read, of the U. S. Geological Survey, who found it in a collection of fossil plants. Although insects have previously been reported from the Permian beds of Texas, this is the first to be formally described. The fossil represents a new species and genus of the Order Protorthoptera.

Family Ideliidæ

This family is known by three genera, *Idelia* Zalessky, *Metidelia* Martynov, and *Sylvidelia* Martynov, all from Permian strata of Russia. Related species of the family Lepiidæ occur in the Elmo beds in Kansas, though the family Ideliidæ itself has not yet been found there.

Ideliopsis, new genus

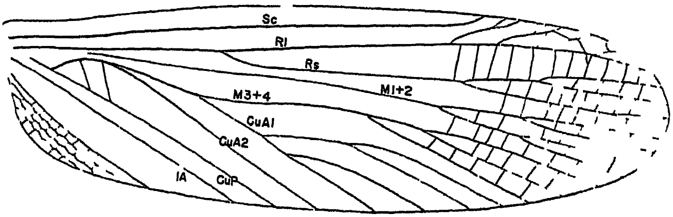
This is related to *Idelia* and *Metidelia,* but the fore wing differs in having distinct cross-veins apically, instead of cellules, and in having the posterior branch of the media anastomosed proximally with CuA.

Genotype: *Ideliopsis ovalis,* n. sp.

Ideliopsis ovalis, n. sp.

Figure 1

Fore wing: length, 25 mm.; maximum width, 6 mm. Anterior margin only slightly arched, nearly straight. Rs arises just proximad to the middle of the wing, and has three main branches and a terminal twig on R4 + 5. The base of the media is not preserved, but the anterior branch of M (possibly MA) is unbranched to about the level of the first fork of Rs; it has four terminal branches. The main posterior branch of M (possible MP) is anastomosed with CuA until about the level of the orgin of Rs; it diverges away and terminates in three branches. Cu has the characteristic form of the Ideliidæ, with a straight and weak CuP, and a well developed CuA. The latter forks shortly after its origin, forming a straight posterior branch (CuA2) and a double-forked CuA1. The anal veins are unbranched and straight or nearly so. Cross-veins are preserved only in the apical part of the wing, where they are numerous and arranged at right angles to the longitudinal veins. There is no indication of cellules, except in the anal area, where the cross-veins are short and close together, much as in *Metidelia*.



Ideliopsis ovalis, n. gen. and n. sp. Fore wing. drawn from holotype. Sc, subcosta; R1, radius; Rs, radial sector; M1 + 2, anterior branch of media; M3 + 4, posterior branch of media; CuA, anterior branch of cubitus; CuP, posterior branch of cubitus; 1A, first anal vein.

Holotype: No. 112018, U. S. National Museum, Washington, D. C.; collected 2½ miles south-east of Fulda, Texas, in Castle Hollow.[1] The specimen consists of a nearly complete anterior wing and fragments of the other wings. The insect has been flattened to such an extent that convexities and concavities of the veins are weakly indicated at most. The rock containing the fossil is a bluish-gray, friable clay-shale. Horizon: Lower Permian (Belle Plains Formation, Wichita Group).

Ideliopsis seems to fit more readily into the family Ideliidæ than into the related Lepiidæ. All known species of the latter family, which is represented in the Lower Permian beds of Kansas, have a less strongly arched CuA. Additional specimens of these two families may show that they are really inseparable. All the described Lepiids and Ideliids have a net-work of cross-veins covering the entire wing, and all have the posterior branch of M independent of CuA. The conclusion that these two veins are partially anastomosed in *Ideliopsis* has been reached by comparison with *Metidelia* and *Idelia*. In both of these, the media has a long posterior branch and CuA has two main branches. In *Ideliopsis*, M appears to lack the long posterior branch and CuA appears to have an extra anterior branch. It seems probable, therefore, that the posterior branch of M has become attached to CuA1.

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[1] This locality is mentioned by David White, 1912, Proc. U. S. Nat. Mus., 41: 495.

The stratum which yielded *Ideliopsis* is apparently about the same age as the insect beds near Elmo, Kansas. At any rate, the Belle Plains Formation of Texas, in which the specimen of *Ideliopsis* was found, has tentatively been correlated with the Wellington Formation of Kansas, of which the Elmo limestone is a member.[2] C. B. Read (in King, 1939, p. 697) has referred to the plants of the Belle Plains Formation as a "Gigantopteris assemblage." David White, who published a list of the plants of the Formation,[3] noted the occurrence of insects in the main plant bed, 4½ miles southeast of Fulda, though he did not mention their being found at Castle Hollow. In 1932 I searched for insects at both localities for several days, but without success.

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[2] A. S. Romer, 1935, Bull. Geol. Soc. Amer., 46: 1597–1658 (esp. fig 3). P. B. King, 1939, Bull. Amer. Assoc. Pet. Geol., 26: 535–763.

[3] David White, 1912, Proc. U. S. Nat. Mus., 41: 506.

PSYCHE

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THE GENUS *PACHODYNERUS* (HYMENOPTERA, VESPIDÆ) IN THE ANTILLES[1]

BY JOSEPH C. BEQUAERT
Museum of Comparative Zoölogy, Cambridge, Mass.

The key to the Antillean species of *Pachodynerus* and the appended brief notes on their synonymy and distribution are extracted from a large manuscript covering the vespid fauna of these islands. They will help to clarify the affinities of a new Cuban species recently received from Dr. S. C. Bruner, who kindly presented the types to the Museum of Comparative Zoölogy.

1. Thorax very short and high, nearly cubical, scarcely longer than wide. Postscutellum crossed by a sharp, finely crenulate ridge. Superior ridge of propodeum with a complete, high, translucent lamella. Edge of first abdominal tergite evenly rounded in profile, not bluntly angular, with minute, scattered punctures. Ocellar area more or less grooved. Clypeus of male with a median pair of low longitudinal humps. Black, with pale brownish-yellow markings; abdomen dull, with appressed short hairs; head and thorax with longer, somewhat silky pubescence *P. nasidens.*

   Thorax either markedly longer than wide or (in *alayoi*) superior ridge of propodeum incomplete, not lamellar. Black with bright yellow markings, sometimes partly ferruginous-red. Body dull or more or less shiny, without appressed short hairs and without silky pubescence .... 2.

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

2. Edge of first abdominal tergite bluntly angular and slightly swollen at the junction of basal slope and apical horizontal area, the latter with coarse punctures. Superior ridge of propodeum with a complete lamella; concavity with strong transverse striæ and coarse punctures. Interocellar area slightly grooved. Clypeus of male with medium-sized punctures and a median pair of low longitudinal humps. Inner margin of mandible of male with the basal tooth low and broad. Black; head and thorax with many yellow markings; tergites 1 and 2 and sternite 2 with apical yellow bands; legs mostly ferruginous-red .... *P. jamaicensis.*

   Apical horizontal area of first abdominal tergite minutely punctate. Concavity of propodeum either mostly smooth or finely transversely striate .... 3.

3. Superior ridge of propodeum low and irregular, not forming a complete lamella. Thorax only very slightly longer than wide. Edge of first abdominal tergite not angular, evenly rounded at the junction of basal slope and apical horizontal area. Interocellar area grooved. Clypeus of male with medium-sized punctures, without median longitudinal humps. Inner margin of mandible of male with the basal tooth low and broad. Black; head, thorax and legs profusely marked with yellow; tergites 1 and 2 and sternite 2 with apical yellow bands. .... *P. alayoi.*

   Superior ridge of propodeum with a complete, high sometimes translucent lamella. Thorax distinctly longer than wide .... 4.

4. Edge of first abdominal tergite not angular, evenly rounded at the junction of basal slope and apical horizontal area. Interocellar area slightly grooved. Clypeus of male with minute sculpture and a median pair of low longitudinal humps. Inner margin of mandible of male with the basal tooth high, triangular. Black; head, thorax and legs profusely marked with yellow; abdomen with apical bands and sometimes (var. *sancti-vincenti*) with lateral spots on tergite two .... *P. guadulpensis.*

Edge of first abdominal tergite bluntly angular and often slightly swollen at the junction of basal slope and apical horizontal area .... 5.

5. Interocellar area flat or scarcely depressed. Clypeus of female coarsely punctate; of male slightly longer than wide, with medium-sized punctures, without median longitudinal humps. Inner margin of mandible of male with the basal tooth low and broad. Black; head, thorax and legs profusely marked with yellow; tergites 1 and 2 and sternite 2 with apical yellow bands (also two discal spots on tergite 2 in var. *barbouri*) .... *P. tibialis.*

Interocellar area distinctly grooved. Clypeus of female with medium-sized punctures; of male about as long as wide, with medium-sized punctures and a median pair of low longitudinal humps. Inner margin of mandible of male with the basal tooth high, triangular .... 6.

6. Sculpture of head and thorax very coarse; pronotum, scutellum and postscutellum almost rugoso-reticulate. Cheeks rather swollen in profile, at least half as wide as the eye at the occiput. Colored much like *P. cubensis* in typical form, but the apical abdominal segments often less extensively ferruginous or entirely black; in var. *bahamensis*, base of first abdominal tergite extensively ferruginous-red.
P. scrupeus.

Sculpture of head and thorax dense, but moderately coarse, not rugoso-reticulate. Cheeks barely swollen in profile, less than half as wide as the eye at the occiput. Black; head and thorax profusely marked with yellow; tergites 1 and 2 and sternite 2 with apical yellow bands (much widened at the sides of tergite 1); base of flagellum, femora and apical segments of abdomen more or less extensively ferruginous-red .... *P. cubensis.*

1. *Pachodynerus nasidens* (Latreille, 1817). *Odynerus simplicicornis* de Saussure (1855), described from Cuba, I regard as a synonym, being unable to find any consistent difference between Cuban and continental American specimens. The wasps recorded as *O. brachygaster* from Cuba, by H. Lucas and Gundlach, were also *P. nasidens.* I have never seen the true *P. brachygaster* (de Saussure, 1853) from any of the Antilles. *P. nasidens* is widely distributed throughout most of Central and South America and is at present spreading outside the New World. It is common in Cuba, Hispaniola, Jamaica and Puerto Rico. In the Bahamas it has only been taken thus far in New Providence. I have seen a specimen labelled Miami, Florida, no doubt an accidental introduction. Whether *Pachodynerus acuticarinatus* (Cameron), of Texas and Arizona, and *P. pulverulentus* (Viereck), of Arizona and Southern California, are specifically or racially distinct from *P. nasidens* is as yet undecided.

2. *Pachodynerus jamaicensis* Bequaert and Salt, 1931. This species is restricted to Jamaica. It includes the wasps recorded from there by Fox, Ashmead, and Gowdey as *O. tibialis,* and by Gowdey as *O. guadulpensis,* two species I have never seen from Jamaica.

3*a*. *Pachodynerus guadulpensis* (de Saussure, 1853), typical form. Originally described from Guadeloupe, this form of the species is found in most of the Lesser Antilles. I have seen it from Antigua, Montserrat, Dominica, Martinique, St. Lucia, the Grenadines (Canouan I.), Grenada, and Barbados. Published records from Jamaica and Trinidad were based on misidentifications. *Odynerus guadelupensis* Dalla Torre (1904) is an emendation of *O. guadulpensis.* According to the types, at British Museum and U. S. National Museum, *Odynerus grenadensis* Ashmead (1900) is not separable from *guadulpensis;* the structural characters are the same, while the apical bands are not actually absent on the tergites behind the second, as implied in the original description, but are dirty orange or ferruginous, instead of yellow, evidently an artificial discoloration. Similar discoloration may be seen in some specimens from the other islands. The dorsal face of the pronotum is sometimes wholly yellow, as stressed by de Saussure; more often it bears on each side a small discal, triangular black spot.

3*b*. *Pachodynerus guadulpensis* var. *sancti-vincenti*

(Ashmead, 1900). I have seen the types of *Odynerus sancti-vincenti* at the British Museum and at the U. S. National Museum, as well as two additional females collected in St. Vincent by J. Ogilvie. Structurally these wasps agree with *P. guadulpensis* from the other Lesser Antilles, but they are more abundantly marked with yellow. The apical band of the first tergite extends along the sides and often projects somewhat inward along the edge of the slope. Usually also there is a free discal yellow spot on each side of tergite two. In some of the types these spots are very small or barely indicated. I have not seen them in any *guadulpensis* from any of the other Antilles. So far as known at present var. *sancti-vincenti* is peculiar to St. Vincent.

4*a*. *Pachodynerus tibialis* (de Saussure, 1853), typical form. So far as known, this form is restricted to Hispaniola and the neighboring Mona Island. It is black, with fairly numerous yellow markings on head, thorax and legs; but clypeus, mesopleura and propodeum are mostly black; tergites 1 and 2 and sternite 2 have a broad yellow margin, but there are no yellow discal spots.

4*b*. **Pachodynerus tibialis** var. (or subsp.) **barbouri**, new.

Female.—Black, with the following parts yellow: entire clypeus; narrow margin of lower inner orbits; streak along upper outer orbits; small interantennal spot; basal spot on mandible; scape beneath; much of dorsal area of pronotum; most of mesopleura, tegulæ and propodeum (broad center of concavity black); postscutellum; broad apical margins of tergites 1 and 2 and sternite 2; that of tergite 1 abruptly widened and extending somewhat mesad along the edge of the slope; that of sternite 2 extensively widened on the sides; a spot on each side of tergite 2 narrowly divided from the yellow margin; most of coxæ; apical portion of fore and mid femora; apical spot on hind femora; tibiæ except for a narrow inner black streak. Structurally like the typical form, except that the lamellar superior ridge of the propodeum is not straight but wavy, forming a broad upward curve midway between the lateral angle and the postscutellum. If this peculiarity is found consistently in other Bahaman specimens, *barbouri* may have to be raised to specific rank. The unknown male may furnish additional characters.

Bahamas: Great Inagua, female holotype, February 26, 1934 (Utowana Expedition.—M. C. Z. No. 27832).

Named for the late Dr. Thomas Barbour, in appreciation of his lifelong interest in the Antillean fauna.

5. **Pachodynerus alayoi**, new species.

Male.—Similar to *P. guadulpensis* and *P. tibialis*, except for the following. Interocellar area deeply grooved, with longitudinal swellings near the posterior ocelli; the latter slightly farther apart than their distance from the eyes. Ridge between antennæ low, not carinate. Clypeus slightly higher than wide, relatively narrower in upper area than in *tibialis*, the inner orbits being slightly over one and one-half times as far apart on the vertex than at the narrowest of the clypeus; surface barely convex, without median longitudinal humps; lower free portion much shorter than upper interocular part; truncate apex relatively narrower than in *tibialis*, less than one-third of the greatest width of the clypeus. Mandible as in *tibialis*, the inner margin with the basal tooth low and broad. Thorax seen from above scarcely longer than greatest width, relatively shorter than in *tibialis*. Propodeum: superior ridge poorly developed, except close to the lateral angle where there is a short, low carina; elsewhere the coarse sculpture of the dorsal areas extends beyond the ridge onto part of the concavity as medium-sized punctures; lateral angle low, blunt. First abdominal tergite not in the least angular at the junction of basal slope and horizontal apical area, as evenly rounded off as in *guadulpensis*.

Head and thorax very coarsely punctate, almost rugoso-reticulate, much as in *jamaicensis*; but concavity of propodeum mostly smooth, with a median area of a few, weak transverse striæ. Clypeus with scattered medium-sized punctures, about as in *tibialis* and *jamaicensis*. Sculpture of abdomen as in *tibialis*.

Black, without ferruginous, with the following areas yellow: clypeus; most of lower half of face; a broad streak along upper outer orbits; a large basal spot on mandible; scape, except for a black streak above; broad humeral margin of pronotum (including carina); two spots on scutellum; most of postscutellum; a large spot on upper mesepisternum; most of dorsal areas of propodeum, the yellow continued over the sides close to the lateral angles; most of tegulæ; legs except for coxæ and part of femora, the tarsi darker, more or less ferruginous; and broad apical margins on tergites 1 and 2 and on sternite 2, not abruptly widened at the sides. Wings as in *tibialis*.

Length (h. + th. + t.1 + 2), 7 mm.; of fore wing, 6 mm.

Female.—Except for the usual sexual differences, like the male in structural characters and color markings. Clypeus about as high as wide, the inner orbits about one and one-third times as far apart on the vertex as the narrowest of the clypeus; lower free portion about as long as upper interocular part; surface coarsely and densely punctate. Clypeus yellow, with a narrow median black streak over apical half.

Length (h. + th. + t.1 + 2), 8 mm.; of fore wing, 7 mm.

The absence of a complete lamellar ridge between the dorsal areas and the concavity of the propodeum is unusual in *Pachodynerus*. It differentiates *P. alayoi* not only from all other Antillean species, but also from most of those found elsewhere, except *P. peruensis* (de Saussure).

Cuba: Siboney near Santiago de Cuba, male holotype, May 5, 1940 (M.C.Z. No. 27829); Ciudamar near Santiago de Cuba, female allotype, January 18, 1948; both collected by Mr. Pastor Alayo.

6. *Pachodynerus cubensis* (de Saussure, 1853). Known only from Cuba, where it seems to occur everywhere, being one of the characteristic elements of the fauna.

7a. *Pachodynerus scrupeus* (Zavattari, 1912), typical form. Found in Cuba, where it appears to be rare (Preston and Banes, in Oriente; Santiago de las Vegas), and more commonly in the Bahamas (Cat I.; New Providence; Rum Cay; Eleuthera). Most of the Cuban specimens are colored much like *P. cubensis;* but the yellow markings are somewhat more extensive, while the ferruginous color covers more of the flagellum. In some Cuban specimens the apical abdominal segments are as extensively ferruginous-red as in *cubensis;* in the Bahaman specimens they are almost wholly black. One Cuban specimen, however, is in this respect like those of the Bahamas, so that the Bahaman wasps without reddish on the base of the first tergite do not seem to be racially distinct from the Cuban ones.

7b. *Pachodynerus scrupeus* var. *bahamensis* Bequaert and Salt, 1931. This form differs from typical *scrupeus* in the first tergite of the abdomen being tricolored, broadly red at base (to beyond the angular edge), narrowly black in the middle, and banded with yellow at apex. The terminal segments of the abdomen are black in all specimens seen. Known only from the Bahamas: New Providence; Andros I. (Andros Cay); Long I. (Clarencetown); Watling I.; Rum Cay.

Male (undescribed).—Similar in color to the female, except that the clypeus is entirely yellow. Structurally it agrees with the male of typical *scrupeus.*

Allotype from New Providence, Bahamas, May 1, 1932 (J. G. Myers). Both holotype and allotype at M.C.Z. (No. 27832).

PUPAL PARASITES OF TABANIDÆ.—To complete the record the following references should be appended to my note on the pupal parasites of the Tabanidæ (Bailey, 1947). The chalcid *Diglochis occidentalis* Ashmead, of the Pteromalidæ, was reported as a parasite of three species of *Chrysops,* namely *C. excitans, C. mitis* and *C. moerens,* by Cameron (1926) and Philip (1931) found four pupæ of *C. mitis* parasitized by this species in Minnesota. These were previously overlooked. References: Bailey, N. S., 1947, Psyche, 54(2): 142; Cameron, A. E., 1926, Bull. Ent. Res., 17(1): 39–40; Philip, C. B., 1931, Minn. Agric. Exper. Station Tech. Bull., 80: 68.—N.S. BAILEY, Biological Laboratories, Harvard University.

NOTES ON PERLIDÆ[1]

By Nathan Banks
Holliston, Mass.

1. Perlesta

The species of *Perlesta* are of moderate size; they have three ocelli; the antennæ have basal joints as long as broad, with many fine appressed hairs, each joint with one or more longer erect hairs (sense hairs). The femora have not only fine hairs below but also longer bristles scattered among the hairs (most noticeable on the front femora). In the fore wings the anal cell at base of wings gives rise on the lower edge to a recurrent vein (the anal brace), the anal lobe is small, but, with the wings spread, readily seen, and the outer part of the anal brace crosses it; in the hind wings there are usually several cross-veins in the cubital area, but sometimes only one besides the end cross-vein and rarely only the end cross-vein; there are no cross-veins in apical part of wings, except in costal area. The setae are rarely as long as the abdomen, with many stout hairs, and near tip of each joint one or two much longer erect hairs, often as long as the joint, the first few joints are hardly longer than broad, but soon the joints are extremely long. The last joint of maxillary palpi is usually hardly one-half of the third joint. The V-mark is two slightly diverging arms, quite broad throughout and reaching about half way to the front margin. The genotype is *Perla placida* Hag.

Perlesta placida Hag. is common at and near Washington, and is found generally from Canada to Louisiana, east of the Appalachian Mountains, except in New England. Normally it has a pale yellowish head, with a shining black spot covering the ocelli, but not extending to the front of head; the pronotum is brown to yellowish brown, sometimes with a pale median stripe; the thorax, abdomen and legs are yellowish; the wings are clear, the veins pale or pale brown. Specimens with only a black bar connecting the hind ocelli were described by me as *P. virginica;* it is only a color form. Specimens without any black on head were named *P. immaculata* by Klapalek, this also is a color form. All of these have the genital prongs in the male very slender, usually near each other and each curved outward toward tip; the subgenital plate shows two lobes with truncate tips.

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[1] Published with a grant from the Museum of Comparative Zoölogy at Harvard College.

In 1862 Walsh described two species from Rock Island, Illinois; he put each in a separate subgenus, since one had but one branch to radial sector and the other had two branches. *P. decipiens* and *P. brunneipennis* usually have the black spot covering the ocelli, *decipiens* has clear wings, *brunneipennis* has infuscated wings. The genital prongs are very similar but quite different from *P. placida*, being much stouter and bent near the middle.

I consider that these two forms represent but one species, *P. decipiens.* It is the common form in the mid-west from Michigan to northern Texas. However there is a black species in this area, much less common, this is *Perlesta cinctipes* Bks. The body and wings are almost wholly black, the edge of the clypeus usually whitish, the legs are pale beneath, the setae are pale, but each joint has a dark band at tip, the hind femora are pale at base and tip, and at tip of hind tibiæ. The legs of this species are shorter and much less slender than in the other species, particularly noticeable in the hind femora. The pale of costal margin is reduced, each end of costal area being dark. In the female the subgenital lobes are large and the tips plainly rounded. In the male the genital prongs are very slender and longer than in *placida*, not, or scarcely outcurved at tips.

In 1914 I described another species, *P. texana* from Texas (Dallas, Kerrville, Victoria, Devil's River). It is yellowish to rufous, the ocelli faintly connected by a dark V-mark; legs are pale below with a brown streak above, the hind tibiæ dark except near tip; hind femur fairly slender; sides of ocellar triangle longer than base. In the male the genital prongs are moderately slender, slightly outcurved toward tip, and their bases separated by a basal width. In female the prongs are extremely broad at base, and with a short point, or slender peg at inner corner. Each lobe of the subgenital plate is rounded, but not as hairy as in *nitida*.

Besides the four species mentioned are two new species; one from the streams on the higher slopes of the Smokies, and another the only form seen from New England.

Perlesta placida nitida new race

Head and thorax above black, shining, on head there is a pale yellowish spot between eye and hind ocellus, and on margin over base of antennæ the ridge is yellowish, sometimes the spot by the eye is smaller, or almost gone, and the ridge only partly yellowish; abdomen dull black above, below paler on venter, and on sternum dull yellowish, also on under side of legs, above on legs brown to black, tarsi black; antennæ dull yellowish on basal third of fourth, beyond brown; setæ yellowish on first five or six joints, then more or less brown to blackish on basal half to three-fourths with the tip pale, further out the joints are wholly black. Wings blackish, costal area pale yellowish, veins black.

Structure similar to *placida;* hind ocelli a little nearer to eyes than to each other, lateral boss transverse and placed as in *placida;* pronotum in female about twice as broad as long, in male not so broad, narrowed behind, with strong rugæ on each side; hind femora fully as slender as in *placida,* much more slender than in *cinctipes,* the western black species.

The male genital prongs are shorter, more straight than in *placida* and the apical third is the only narrow part; in the female there is a very broad part for the basal three-fourths and at inner tip a short, slender apical part. The subgenital plate has two lobes, each lobe strongly rounded on tip instead of the truncate lobes of other species; these and the apical margin of the ninth segment have many long hairs, more than usual. The V-mark shows two pear-shaped bodies, with a long stem toward the front ocellus.

Expanse 18 mm.

Two females and male from Holliston, Mass., 22, 30 June, 1 July. One male from Pittsfield, N. H., 5 July

(Bks. coll.). Also three from Connecticut; So. Meriden 17 June, 4 July (H. L. Johnson), and Mt. Carmel, 2 Aug. (Sommermann) (teneral), in the Agric. Exper. Station, New Haven.

Type M.C.Z. no. 27673.

Perlesta frisoni sp. nov.

This is the species occurring in the higher parts of the mountains of North Carolina and eastern Tennessee. It is pale yellowish, no dark spot over ocelli; the pronotum yellowish, but with more or less definite brown marmorations on the sides, sometimes making a broad pale brown band each side; below wholly pale, the legs and setæ also pale, sometimes the hind tibiæ are slightly darkened at base above; wings wholly clear, none at all fumose. Antennæ pale on basal fifth or more, beyond dark. The head and pronotum are a little broader than *placida,* the ocellar triangle not as long as in *placida,* the hind ocelli plainly nearer to eyes than to each other, the lateral boss is transverse and about the diameter of an ocellus and below the ocellus.

The V-mark shows two strongly diverging arms, at upper end pointed, at tip very broad, the inner edge concave.

The pronotum in front is not nearly twice as broad as long, and plainly narrowed behind; the anterior angles are quite sharp, and the front margin more strongly bowed than in *placida.*

The genital prongs of the male are broad at base and taper gradually on both sides to the fairly sharp tip. In the female the base of each prong is much broader, the inner tip prolonged into a short, slender point, sometimes very slender like a peg.

In the female the subgenital plate is transverse and truncate, sometimes a median notch, the apical plates (between bases of setæ) are more prominent, and more sharply pointed than *placida,* not so hairy as in *nitida.*

Many specimens from the Smoky Mts., mostly on the Tennessee side in early September, 1930 (Darlington, Carpenter, Banks).

Expanse 19–24 mm.

Type M.C.Z. no. 27662.

2. NEOPHASGANOPHORA AND HARRISIOLA

Failing to examine the genital prongs of the several species proposed in this genus N. & C. lumped all under *Perla capitata* Pictet, the type of the genus. I did not find the type specimen of the species in Europe in 1912, and Ricker does not mention seeing it. Pictet says he had a male; if it were a *Neophasganophora* he could hardly help seeing and referring to the genital prongs, so much larger than in other Perlidæ. His specimen might well be a species much like, but paler than *media*. *Media* is largely black on the head; this similar form, smaller and paler than *media* has a head largely yellowish with a black spot over the ocellar area and a median triangular black mark on the lower face, exactly as Pictet figures *capitata*. This form belongs to *Perla* (or *Togoperla*) and the male has only small genital prongs and often in dried specimens are depressed in the cavity, so as scarcely noticeable. Therefore I replace *Neophasganophora* of Needham with *Harrisiola*, and *Perla flavescens* Walsh as genotype. *Harrisiola* is readily separable, in the male from *Perla* or *Togoperla* by the elongate genital prongs, but both sexes are also separated by the course of the occipital line; in *Harrisiola* the ends of the occipital line bend forward close to the outer edge of the lateral bosses; in *Perla* (*Togoperla*) the line passes well above the lateral boss toward the eye.

In the synoptic table of the species below I have used color, for I find that where we have a number of specimens and from various localities, the color of setæ, of hind femora, and the type of head marking is the same throughout, and that they follow the shape of the male genital prongs, and therefore when specimens, tho few, show differences in these points I treat them as distinct species.

The figure of the genital prong given by Klapalek is not like that of the Loudonville specimens I sent him; and the figures of Needham and Claassen (Plate 19, figures 1 and 2) are not at all the common *flavescens* but probably of *H. americana,* and the female (fig. 3) also fits this species.

1. Hind femora mostly pale, with a broad black band across near base; several joints near base of setæ

pale; apical part of genital prongs divided by a constriction, the outer part slender toward tip; the fifth dorsal segment projecting in a fairly broad lobe. *annulipes.*

Hind femora without a band near base, but often an elongate spot not reaching across .... 2.

2. Hind femora (and others) with upper side black and lower edge with a dark line, sometimes incomplete; setæ wholly black except extreme base of first segment; produced part of fifth dorsal segment broad behind, lightly rounded; last section of genital prongs very long and slender .... 3.

Hind femora (and others) with upper side partly or wholly dark, lower without dark; tip of produced part of fifth dorsal segment not so broad; last section of genital prongs often shorter .... 5.

3. Base of fore wings plainly yellowish, wings pallid; hind corners of head yellow; femora with dark streak above and below; last section of genital prongs scarcely, if at all, scabrous above .... *flavescens.*

Base of fore wings not plainly yellowish, but more or less darkened .... 4.

4. Base of fore wings plainly black, and general surface and veins darkened; head black except a pale dot on each boss and on bases of V-mark; femora almost wholly black, a pale streak on side toward end; apical part of prong scabrous and as long as in *flavescens;* setæ black .... *nigrescens.*

Base of wings not so dark, head with hind corners yellowish as in *flavescens;* wings and veins almost as dark as in *americana;* at least basal half of setæ pale yellowish; apical part of prongs quite short *abbreviata.*

5. Apical part of prongs almost as long as in *flavescens* and not scabrous above; setæ almost wholly pale, scarcely any dark on abdomen; wings an even dull yellowish brown, no pale base .... *tristis.*

Apical part of prongs much shorter, often scabrous above, setæ with only a few joints toward base pale .... 6.

6. Last part of prongs about three times as long as broad, not scabrous, just before tip with a few distinct spicules or short spines; setæ entirely black; pro- meso- and metanotum with an elongate pale spot, tips of femora broadly black across .... *modesta.*

Last section of prongs scarcely more than twice as long as broad, tip more pointed; no pale marks on thorax above .... 7.

7. Preapical part of prongs but little longer than apical part .... *klapaleki.*

Preapical part of prongs fully twice as long as the apical part .... *americana.*

Harrisiola flavescens Walsh

This species, easily recognized by the yellowish base to fore wings, is typically from Illinois, but the eastern *marginipes* Provancher is the same species, and occurs from southern Canada down to Washington, D. C. The eastern forms are sometimes a little darker, but the prongs are like those of a Walsh paratype at the M.C.Z. *Perla illustris* Bks. and *P. innota* are synonyms of *marginipes.*

Paratype M.C.Z. no. 10127.

Harrisiola nigrescens sp. nov.

Head and thorax both above and below largely black, with only bosses and a spot on each arm of the V-mark pale, under side of head with a few pale spots, hind part of metasternum pale, abdomen mostly rufous, last five segments with a black apical mark over the posterior part, some on dorsum but more on sides and venter, not nearly reaching middle of venter; the sixth and seventh ventral segments show a median dark area, not as prominent as in *flavescens;* setæ jet black, palpi black, antennæ mostly black, but the basal fourth more or less pale; wings with very distinct dark veins, basal costal area before first cross-vein black, no sign of the yellowish base of *flavescens;* area of anal cell, some in front and beyond also black. Legs mostly black, femora with an elongate pale streak on outer half before tip, tibiæ more brown, but tarsi black.

The fifth segment of male is prolonged about as in *flavescens,* but not such a broad tip; the last section of the genital prongs is long, but not quite as long as *flavescens,* and without any little spinules; last section longer than in *tristis.*

Length of body, 12 mm.; of fore wing 13 mm.

Three males from Antrim Co., Mich., 6 July (Dreisbach).

Type M.C.Z. no. 27719.

Harrisiola annulipes Hag.

The head has a broad black mark from occipital line to front margin, broken by pale between each hind ocellus and the lateral boss and the arms of the V-mark are rather broadly pale. The femora have a broad band across basal half and a narrow band at tip, the upper and lower edges between are pale. The setæ are pale on several basal joints.

The genital prongs are long, the apical section swollen at base and then slightly constricted beyond from where it tapers to the pointed tip, from above this part is seen to be compressed, the preapical part has fairly large spinules above. In the female the ventral plate is rather strongly rounded, on each side is a rounded dark spot and the outer half of the marginal part is dark, the preceding segment has a dark spot in the middle.

It is not uncommon in the vicinity of Washington, D. C. Also occurs at Easton, Pa., and in Montgomery Co., Pa.

Type M.C.Z. no. 249.

Harrisiola tristis Hag.

This was based on two males from Trenton Falls, New York. I have seen no other males like them. The femora are dark along upper edge as in *marginipes,* but the lower edge pale; the setæ are almost entirely pale; there is black between the hind ocelli and bosses. It is a small species, and a female from the Delaware Water Gap is of the same size and may belong to it, with the femora dark above and pale below and pale setæ. The last section of the genital prongs has the upper edge more strongly curved than in *flavescens*, and, from side, is broader in the middle. The head has a little more pale in front than *flavescens*, venter pale, antennae pale for some distance. The prongs are long, the apical part very long and much curved down, and not scabrous above.

Type M.C.Z. no. 245.

Harrisiola americana Bks.

This has the head black behind occipital line, pale each side between hind ocellus and boss, and pale over the V-mark. The genital prongs show a rather short apical part, and long basal part with erect hairs and numerous spicules above, the two parts separated by a strong constriction. The hind femora are partly or wholly dark on upper edge, the lower edge pale; setæ mostly dark, but a few joints at base pale.

Type M.C.Z. no 11324.

Harrisiola klapaleki sp. nov.

This is very similar to *americana*, but differs in the much shorter preapical part of the genital prongs. The hind femora have more black on basal part above; but the lower margin is dark only near base.

The female has the ninth segment below black each side, pale in middle, the subgenital plate less convex (not lobed as in *americana*), and black or dark, except for the pale apical depression.

From Loudonville, Ohio, 6 July (Osburn).

Type M.C.Z. no 27717.

Harrisiola modesta sp. nov.

Head largely yellow, ocellar area black, and a broad dark band below the V-mark. The pronotum has a pale median streak, not reaching front and broader behind, an irregular pale spot on middle of meso- and metanotum. Tip of femora broadly black across; setæ entirely black; last ventral segment (9) has a dark spot each side near outer margin; wings mostly blackish.

Last section of genital prongs much shorter than in *flavescens*, about three times as long as broad (from side) not, or scarcely broadened in middle, nearly cylindric, not scabrous above, but tip of preapical part with a few spinules.

From Marietta, Ohio, 7 June (Holden).

Type M.C.Z. no. 27718.

Harrisiola abbreviata sp. nov.

Head marked much as in *flavescens,* the hind corners yellow; femora with a black streak above near base and another near tip, lower edge narrowly black, hind tibia almost wholly pale; wings and veins darkened, almost as much as in *americana,* no flavescent base; venter with dark side and two dark spots in the middle; antennæ dark; setæ with at least basal half pale yellowish.

Genital prongs with the apical part much shorter than in *flavescens,* and not scabrous above, but preapical part has a few spinules near tip above.

A little smaller than *flavescens.*

Taken near Grand Gorge in the Catskill Mts., N. Y., in the latter part of June 1889 (Bks).

Type M.C.Z. no. 27720.

3. Some new species

Pictetia bimaculata sp. nov.

Brown marked with pale yellowish, ocelli joined by fairly broad, almost black lines, a pale yellowish triangle within, laterally, each side of the front ocellus the dark is extended nearly to the margin of head. Most of the middle of face is a paler brown as in figure, pale yellow on bosses and over and between the V-mark. Head between eyes convex and here broader than long, behind eyes the sides curve inward; ocelli in triangle about one and one-third times as broad as long, hind ocelli scarcely as near to eyes as to each other; palpi brown, maxillary palpi very slender, third and fourth joints about equally long and each about as long as an eye. Antennæ black, fourth and fifth joints each broader than long, clothed with short, pale hair and near end of each joint the very short, erect sense hair.

Pronotum not quite twice as broad in front as long, anterior side plainly convex, anterior corners projecting a little, behind much narrower than in front, with a broad, pale median stripe, and each side including margin, dark brown; inner two-thirds of each side with short, irregular ridges; rest of thorax black above, brown below; legs rather evenly pale brownish, tarsi black; abdomen dull brown above and below, ninth ventrite with a rounded, swollen black spot each side; ventral plate broad, and broadly rounded.

Wings faintly tinted, veins not very dark, anal cell about twice as long above as broad at tip; anal brace reaches from near base of cell across anal area, but no anal lobe here; cubito-anal cross-vein plainly its length beyond cell, not darkened; subcosta ends some distance before cord, only a few costal cross-veins, and one beyond cord; radial sector forks once not far beyond cord; in hind wings no extra cubital cross-veins; abdomen fully as long as head and thorax.

Length of body 12 mm.; of fore wing 12 mm.

From Digby, Nova Scotia, 28 May 1905 (Russell).

Type M.C.Z. no. 27723.

Atoperla consors sp. nov.

Head dark brown; only the antennal ridge opposite antennæ and the basal part of the V-mark pale; palpi brown; antennæ pale on basal part, soon becoming brown. Legs dull yellowish brown, tarsi darker; thorax and abdomen dark brown, setæ pale yellowish.

Head only a little longer than broad, not as much longer as in *ephyre;* dark spots on ninth ventrite sometimes showing; wings fully as slender as in *ephyre.*

Ventral plate of female shows a median broad V-line, and from each end a line at first curving in and then rounding out, with outline of a square in the middle, otherwise very similar to *A. ephyre.*

Length body 8 mm.; of fore wing 10–11 mm.

From Kingston, R. I., 23 June (Barlow); Pittsfield, N. H., 5 July (Bks). Differs in the almost uniformly dark head, which is a little shorter, and in details of the ventral plate.

Type M.C.Z. no. 27722.

Neoperla clymene subsp. **mainensis** nov.

This form differs radically from the common form in the blackened body and wings; head and thorax deep black, sometimes a little rufous each side of anterior ocellus; antennæ mostly black, a few joints beyond second paler. Wings with black veins and the membrane infuscate, even the costal border of fore wing is black at base and beyond scarcely yellowish, only not as dark as rest of wing; abdomen black above and below, extreme tip above in genital area paler; femora dark brown to black, the lower edge paler; setæ pale, with dark at tips of joints, and farther out wholly black.

The ocelli are a little more separated than is usual in *N. clymene.* The genital prongs, instead of slightly evenly curved, are bent so that the apical part is parallel to its fellow; the slender conical process on the seventh dorsal segment is longer than in typical *clymene,* and extends over most of the next segment.

Type M.C.Z. no. 27725.

Mr. A. Loveridge has taken numerous specimens of this black form at Rome, Maine, 26 June to 8 July.

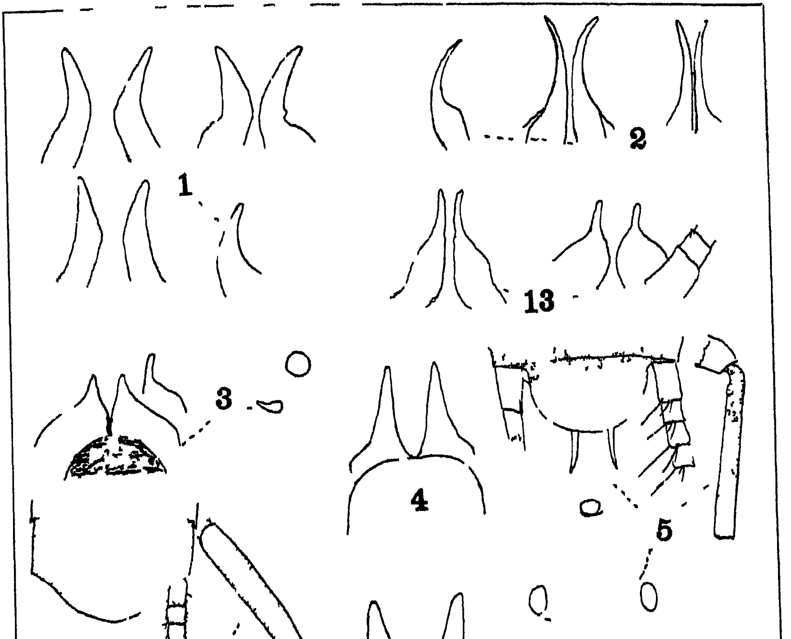
Peltoperla nigrisoma sp. nov.

Body above and below jet black, except a pale yellowish triangular spot over anterior corners of face from eye

Explanation of Plate 11

Fig. 1. *Perlesta decipiens*, male genital prongs, and one from side.
Fig. 2. *Perlesta placida*, male genital prongs, and one from side.
Fig. 3. *Perlesta frisoni*, female anal plates, and ocellus and boss.
Fig. 4. *Perlesta frisoni*, male genital prongs.
Fig. 5. *Perlesta texana*, tip of abdomen, ocelli, and hind tibia.
Fig. 6. *Perlesta cinctipes*, tip of abdomen, seta, hind femur and tibia.
Fig. 7. *Perlesta brunneipennis*, male genital prongs, and hind tibia.
Fig. 8. *Perlesta texana*, male genital prongs.
Fig. 9. *Perlesta cinctipes*, male genital prongs.
Fig. 10. *Perlesta placida*, tip of female abdomen from below.
Fig. 11. *Perlesta frisoni*, subgenital plate of female, and ocellus and boss.
Fig. 12. *Perlesta nitida*, subgenital plate.

PSYCHE, 1948 VOL. 55, PLATE 11

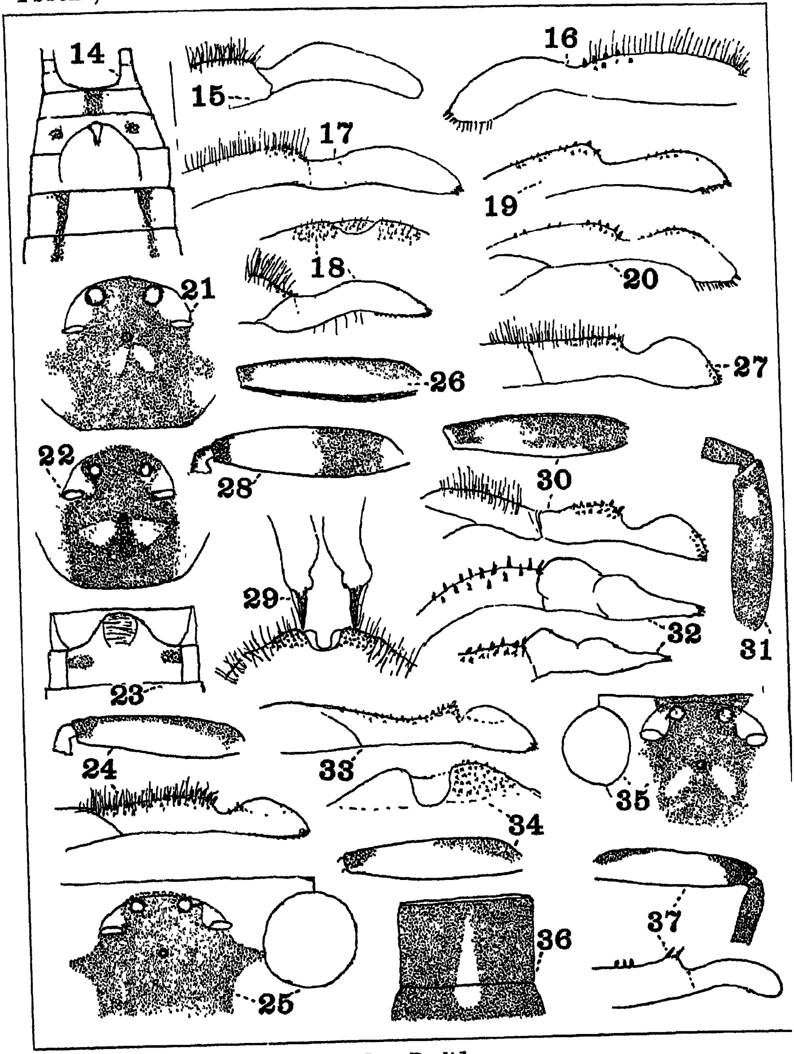


Banks—Perlidæ

EXPLANATION OF PLATE 12

Fig. 13. *Perlesta nitida,* (left) prongs of male, (right) of female.
Fig. 14. *Harrisiola flavescens,* venter of female.
Fig. 15. *Harrisiola flavescens,* genital prongs of paratype.
Fig. 16. *Harrisiola tristis,* genital prong.
Fig. 17. *Harrisiola flavescens,* genital prong of marginipes form.
Fig. 18. *Harrisiola flavescens,* prong from another view and edge of fifth segment.
Fig. 19. *Harrisiola nigrescens,* genital prong.
Fig. 20. *Harrisiola nigrescens,* genital prong, another view.
Fig. 21. *Harrisiola flavescens,* face.
Fig. 22. *Harrisiola annulipes,* face.
Fig. 23. *Harrisiola americana,* ventral plate.
Fig. 24. *Harrisiola americana,* femur and genital prong.
Fig. 25. *Harrisiola modesta,* face.
Fig. 26. *Harrisiola marginipes,* femur.
Fig. 27. *Harrisiola klapaleki,* genital prong.
Fig. 28. *Harrisiola annulipes,* femur.
Fig. 29. *Harrisiola annulipes,* ends of prongs, and tip of fifth segment.
Fig. 30. *Harrisiola klapaleki,* femur and genital prong.
Fig. 31. *Harrisiola nigrescens,* femur.
Fig. 32. *Harrisiola annulipes,* genital prongs.
Fig. 33. *Harrisiola americana,* genital prong and tip of fifth segment.
Fig. 34. *Harrisiola americana,* femur.
Fig. 35. *Harrisiola klapaleki,* face.
Fig. 36. *Harrisiola modesta,* pronotum.
Fig. 37. *Harrisiola modesta,* femur, and genital prong.

PSYCHE, 1948 VOL. 55, PLATE 12

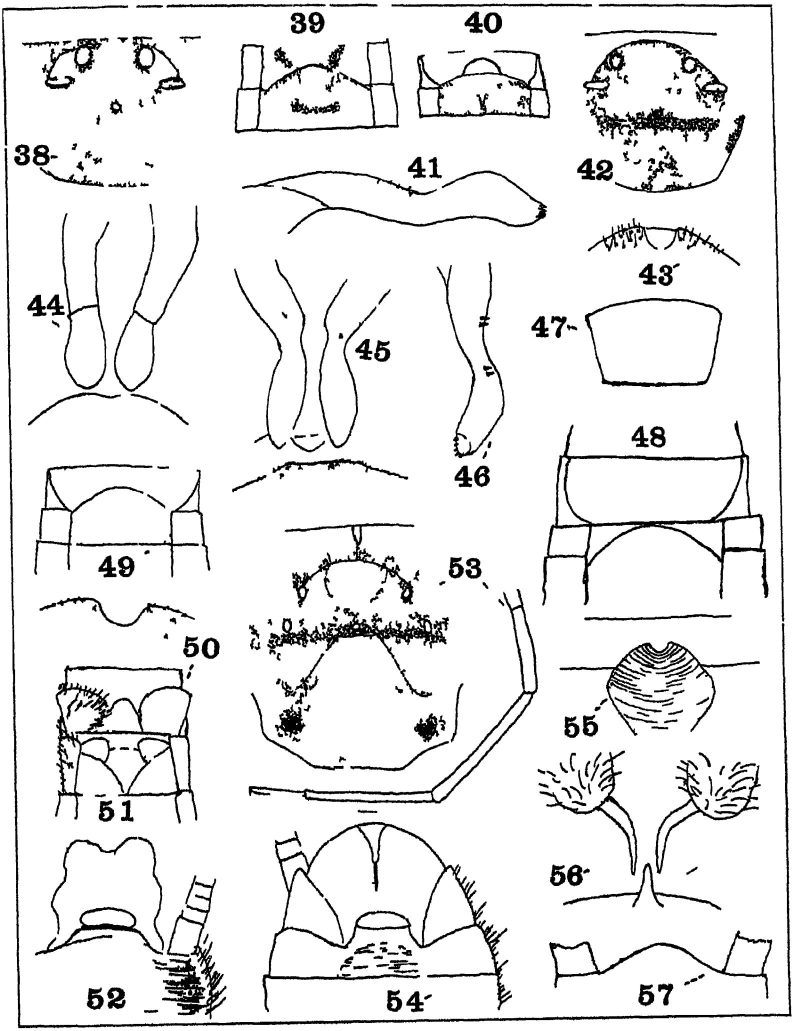


Banks—Perlidæ

EXPLANATION OF PLATE 13

Fig. 38. *Harrisiola abbreviata*, face.
Fig. 39. *Harrisiola klapaleki*, ventral plate.
Fig. 40. *Harrisiola tristis*, ventral plate.
Fig. 41. *Harrisiola abbreviata*, genital prong.
Fig. 42. *Harrisiola tristis*, face.
Fig. 43. *Harrisiola modesta*, tip of fifth segment.
Fig. 44. *Harrisiola abbreviata*, prongs from above.
Fig. 45. *Harrisiola marginipes* form, prongs from above.
Fig. 46. *Harrisiola modesta*, genital prong.
Fig. 47. *Pictetia bimaculata*, pronotum.
Fig. 48. *Pictetia bimaculata*, ventral plate.
Fig. 49. *Perla capitata*, ventral plate.
Fig. 50. *Harrisiola abbreviata*, tip of fifth segment.
Fig. 51. *Atoperla consors*, venter of female.
Fig. 52. *Peltoperla nigrisoma*, tip of abdomen above.
Fig. 53. *Pictetia bimaculata*, face, and maxillary palpi.
Fig. 54. *Peltoperla nigrisoma*, tip of abdomen below.
Fig. 55. *Neoperla clymene mainensis*, ventral plate.
Fig. 56. *Neoperla clymene mainensis*, genital prongs.
Fig. 57. *Neoperla clymene mainensis*, tip of abdomen above.

PSYCHE, 1948 VOL. 55, PLATE 13



Banks—Perlidæ

down, and the hind border of pronotum is whitish. Wings pale brown, veins a darker brown; femora dull yellowish brown, tibiæ scarcely darker except tip is black, as also tarsi. Antennæ nearly all black except pale toward base. Abdomen with erect short hair below, and on lower sides with much longer hair, usually turned inward from each side, upper sides with some short, erect hair. The wings are much like others; radial sector forked once, no cubital cross-veins in hind wings, thirteen costals before end of subcosta. The head is not quite as short as in *brevis*, hind ocelli a little nearer to each other than to eyes. The ninth ventrite has a transverse knob about two and one-half to three times as broad as long.

Length of body 7 mm.; of fore wing 9 mm.

From Sequoia Park, California, 5000 ft., 6 June (Melander).

Type M.C.Z. no. 27724.

NOTES ON *TABANUS ATRATUS* SUBSP. *NANTUCKENSIS* HINE (DIPTERA)

By Norman S. Bailey

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In the course of my field work with the saltmarsh Tabanidæ during the summers of 1946 and 1947 some observations were made on this representative* of the black horsefly which occurs along the coast from New Hampshire to New York. Although adults are never abundant, their large size and noisy flight make them conspicuous on the marshes. During the 1947 season (from late May to September 11th) only 16 specimens (5 males and 11 females) were taken whereas hundreds of *Tabanus nigrovittatus* Macquart (Bailey, 1947) could readily be captured in a short time on almost any day from early July to late August. The first specimen, a male, was collected on July 12th on the Pine Island Marsh in Newbury. Stone (1938) notes June 19th as the earliest record at Dorchester, Massachusetts and Johnson (1919) gives the other seasonal extreme of September 8th at Rochester, New Hampshire. My latest record is a female from Pine Island on September 11th. There is something of interest in the fact that all of my earlier 1947 captures were males. The second one was taken at Ipswich on July 16th, two more on July 24th at Newbury, and the final male at the last mentioned locality on August 27th. Females, possibly of this subspecies, were seen annoying horses in a field above the Parker River saltmarshes on July 15, 1946. In 1947, however, the first female was observed, in the act of ovipositing, on August 19th. From that day until September 8th one or two were seen, and usually taken, on each of my almost daily trips to the marsh.

Pine Island is a partly wooded knoll, large enough for a few cottages, that lies in the midst of the saltmarsh somewhat less than half-way from the mainland proper to Plum Island. It is about a half of a mile from the up-land to the Island over a gravel road that rises only 2–4 feet above the marsh. Usually I drive along this causeway to the mid-section where a small ditch, running parallel to the road on the north, overflows to form a broken chain of small shallow pools. Where these begin I shift into low gear and drive on slowly while watching for Tabanids. The larger ones are readily seen and egg masses can frequently be spotted in this manner. It is convenient to turn in a driveway at the edge of the Island and then drive back to park beside the ditch wherever anything of interest has been noted. Ordinarily, ovipositing females are not easily disturbed and they may be casually approached without any special precautions.

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* My thanks to Dr. Joseph C. Bequaert for this determination.

My experience with the first female is of some interest in this respect. She was busy ovipositing on a blade of *Spartina glabra* Muhl. var. *alterniflora* (Loisel.) Merr. which grew thinly in the shallow water of the pond margin. They show a strong preference for scattered culms rather than dense stands and eggs were found only on this plant. It was about 4 p.m. when she was first observed as I drove towards the Island. (All time E.D.S.T.) There I turned and went back to park as indicated above. Then I crossed the ditch and skirted the pond to get a closer look at her. She seemed quite indifferent as I carefully moved to within a foot of her and even touched the tip of the blade she was laboring on. For several minutes I watched her lay her eggs in the manner so well described by Hine (1903, 1906) for *Chrysops callidus* O. S. and *C. moerens* Walker. Then I decided to return to the car for a container in which to take her alive. She was still at work when I got back, but just as I was reaching out to lower the jar over her she flew away. Her egg mass was probably nearly complete since she had been ovipositing for at least an hour by that time. It measured 15 mm. long by 5 mm. wide at the base. The eggs were glistening white then but by 6 p.m. had become dull and somewhat greyish. By 9:30 the mass was mottled greyish brown and subsequently darkened but slightly. The upper ends of the eggs are a bit darker, which gives the appearance of stripes on close inspection since they are so uniformly placed in the mass. Cameron (1926) states that the darkening process takes about six hours for *Chrysops* eggs, which become jet black. He notes that the pigmentation develops much more rapidly in full sunlight than in the laboratory.

The egg mass of *T. atratus* Fabricius has been described in detail by Hart (1895), and Schwardt (1936) provided photographs which agree closely with Hart's description. Schwardt also states "*T. atratus* deposits its eggs in masses which are so constant in structural plan as to make specific determination of the egg mass readily possible."

This is especially noteworthy since the egg masses of the subspecies *nantuckensis* are strikingly different (see Figure 1). In the words of Hart (1895), *atratus* egg masses are "subconic, with oval base, 10–15 mm. long and 8–10 mm. wide, height 5–7 mm.; sides convex or concave, apex correspondingly rounded or pointed. . . . The eggs are stacked in four or five tiers, one above another, and gummed together in a firm mass." This is the type very rarely found on the saltmarsh where the usual form of the egg mass closely resembles the basal one in the accompanying figure.

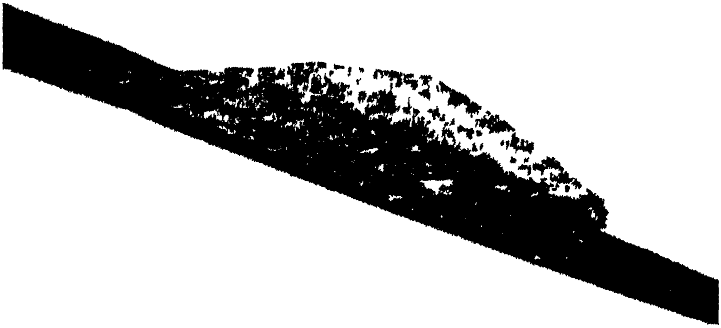

Fig. 1. Egg masses of *Tabanus atratus nantuckensis.* Photograph by Arthur F. Dowsnap, Jr. (About 4 × natural size)

The measurements given by Hart (1895) and by Stone (1930) suggest a maximum of 2 : 1 for the length to width ratio of *T. atratus* egg masses whereas those of the subspecies *nantuckensis* have a minimum ratio of 3:1 and may be over 7:1. This difference in proportions is very characteristic and accounts for a marked difference in the appearance of the saltmarsh egg masses. They are no wider than the supporting grass blade while those of *atratus* may be twice as wide. There may be a possible connection between the more uniform exposure of the eggs in these thinner, extended masses and the temperature conditions of the coastal marshes. *Nantuckensis* egg masses vary at least from 15–35 mm. in length. However, they are very regularly only 4–5 mm. wide which is nearly the width of the *Spartina* blade. Generally they are laid in 2–3 well defined layers and at the highest point the mass will measure only 3–4 mm. Study of the figure will reveal that it is a photograph of a double egg mass. Horseflies not uncommonly add their eggs to previously deposited masses. However, the circumstances were somewhat unusual in this case.

About noon on August 22nd a restless female was seen flying from plant to plant along the border of the roadside ponds at Pine Island. She was apparently selecting an egg site, as subsequent events proved. After stalking her for several minutes, I succeeded in capturing her and put her in a small jar with a blade of grass bearing an egg mass that I had found shortly before. When I reached camp half an hour later she was already busily ovipositing directly over the older mass and continued without interruption until 2:05 p.m. She probably started to lay between 12:30 and 12:45 and, therefore, was so engaged for nearly an hour and a half. As the photograph clearly shows, she neatly arranged her eggs over the older mass. The picture was taken at 4:30 p.m. on August 23rd when the fresher eggs were about 27 hours old. The older ones beneath had hatched in mass early that morning.

The ovipositing behavior of two other females was sufficiently aberrant to mention. When discovered one had laid about three quarters of her eggs and the second had deposited about a third of hers. Those of the first were in three small discreet clusters on the same grass blade. She was put into a pint container with her eggs and while there laid another little batch on the inside of the box. Very few of these eggs produced larvæ.

The other female was handled in the same manner. The form of her egg mass was not unusual, but she apparently lost her sense of direction in the darkness of the container and laid the rest of her eggs in a neat pattern well below the others and with her head up, facing them. This final batch was stacked in four tiers and was, consequently higher than usual.

Hine (1903) stated that, "Between nine o'clock and noon seems to be the favorite time of day for oviposition with the various species of both *Chrysops* and *Tabanus,* and I have seldom been able to observe females ovipositing at other hours of the day." My own observations for *nantuckensis* are just the reverse. All ovipositing was seen in the afternoon—from just after 12 until 5 p.m. However, Cameron (1926) is probably justified in saying that oviposition may take place at any time between 8 a.m. and 5 p.m. on bright days in June and July—and, I would add, in August. It is very likely that there is some such activity in the morning on the saltmarsh, but certainly it is not restricted to the forenoon hours in Essex County.

The incubation period was obtained for three egg masses. Hatching occurred in the early morning in one instance and probably at that time of day in the others. A mass deposited on August 19th hatched on August 26th after an incubation of seven days. The other two, laid August 27th and 29th, hatched on September 5th and 7th respectively after incubating 9 days. In each case the blade of grass was stuck into sand in a pint jar. Water covered the sand to a depth of half an inch and the eggs were at a level just below the rim of the uncovered jar in a relatively moist atmosphere. However, the containers were kept indoors and this probably lengthened the incubation period appreciably. The 7 and 9 day periods correspond with those similarly obtained by Hart (1895) and by Hine (1906), in that order, for *T. atratus* Fabricius, while Schwardt noted a 5 day period for eggs of this species in an outdoor insectary in Arkansas. Full sunlight undoubtedly hastens development.

Among the egg masses taken at the same Pine Island locality in 1946 were two, having all the characteristics described for known masses of *T. atratus* subsp. *nantuckensis*, from which hymenopterous parasites were reared. These were kindly identified for me as the Proctotrypid *Telenomus goniopis* Crawford by C. F. W. Muesebeck. As far as I have been able to ascertain, this species has previously been reported only twice. It was originally described from specimens reared by McAtee from eggs of *Goniops chrysocoma* (O. S.) found on Plummer's Island, Maryland in 1910 (Crawford, 1913). During the 1932 season Schwardt (1936) collected many egg masses of *Goniops* in Arkansas which were similarly destroyed. Therefore, this note reveals another host genus and a considerable extension of range. Although several egg masses were collected and reared in 1947, no parasites appeared. Most of these were taken while the flies were still ovipositing or were laid entirely in captivity. Consequently, they were not long exposed to normal environmental hazards. One of the parasitized egg masses was found on August 13, 1946 and the parasites emerged on August 20th. At the time of preservation, 54 specimens of *T. goniopis* (8 males and 46 females) had emerged. Others were still within many of the eggs. The relatively small number of males produced is apparently usual for this insect.

In reducing *nantuckensis* to a variety of *atratus* and in naming the variety *fulvopilosus*, Johnson (1919) calls attention to the considerable amount of variation seen in this species in coastal areas and raises the question of the influence of the environment as the agent responsible for it. Stone (1938) mentions the fact that many females have both the wing color that distinguishes *nantuckensis* and the lateral tufts of fulvous hairs just above the wing bases which are characteristic of *fulvopilosus*. It is of further interest to note that no males bearing such fulvous hairs have ever been collected. Five of the eleven females taken at Pine Island in 1947 (from August 20th to September 8th) had both varietal features. Two of them laid egg masses which were no different from others found on the saltmarsh. It appears that these names designate the extreme forms in a population showing marked variability. Whether the basis of this variability is genetic, the result of physiological responses to environmental factors or, perhaps, both deserves investigation. Present evidence at least suggests that the *fulvopilosus* condition may be sex linked inheritance. Since there are females with both varietal characters and with no other recognized differences, the validity of distinct names seems questionable. On the other hand, if the form of the *atratus* egg mass has the specific significance indicated by Schwardt (1936), the status of *nantuckensis* needs clarification from this angle as well.

A few observations on the larvæ and pupæ demand notice. The former are most commonly found under mats and piles of straw and other plant debris which becomes stranded in soggy spots subject to frequent tidal flooding or sufficiently depressed to hold rain water. Where such trash lies on soft mud in very shallow water they are especially common. If uncovered they retreat by burrowing rather rapidly into the surface muck. Now and then one may be found in the thick algal mats on the surfaces of deeper pools. These saltmarsh larvæ closely resemble typical *atratus* larvæ as described by Walsh (1863), Riley (1870), Stone (1930), et al. but should be examined critically for possible differences. It would also be interesting to rear some under conditions comparable to (a) salt and (b) fresh marsh habitats to determine what influence, if any, the environment has in the production of the variation characteristic of the adults.

Pupal cases are often numerous in the drift left at the edge of the marsh by exceptionally high tides. This leads one to wonder at the relative scarcity of the flies themselves. The cases may also be found protruding from heaps of straw along the ditch banks. Yet only rarely are living pupæ encountered. One was located on the Parker River saltmarsh just east of Route I on July 17, 1947, and a male emerged on July 21st. This specimen was killed while still somewhat teneral and was reared indoors. The coloration of his wings is only slightly less uniform than in typical *atratus*.

SUMMARY

Original observations on the seasonal distribution, abundance, oviposition, egg masses, incubation period, probable larvæ and the pupæ of *Tabanus atratus* subsp. *nantuckensis* Hine are given. Males were taken from July 12th to August 27th and females from August 19th to September 11th on the saltmarshes of Essex County, Massachusetts. A figure of two egg masses, one superposed on the other by a captive female, shows that the structural plan is notably different from that of typical *atratus* figured by Schwardt (1936) and noted by him to be specifically distinct. The ratio of length to width is not over 2:1 for typical *atratus* egg masses while those of the subspecies *nantuckensis* may be 7:1 and are normally at least 3:1. The incubation period was 7–9 days for egg masses kept indoors between August 19th and September 7th. Probable larvæ of this subspecies occur rather commonly in soggy mats of plant debris on bare mud or where shallow water covers the mud. Pupal cases are numerous in the marsh drift but living pupæ are only rarely recovered from the piles of straw. The question of the validity of the present status of these variants of *Tabanus atratus* Fabricius is raised. *Telenomus goniopis* Crawford is reported as an egg parasite of this species for the first time and with a notable extension of its range.

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THE GENERIC NAME *TROMBICULOIDES* JACOT, 1938[1]

By G. W. Wharton

Department of Zoölogy, Duke University

Jacot (1938) obtained some specimens of mites and identified them as *Trombidium scabrum* Say, 1821. However, he realized that his specimens were not representative of the genus *Trombidium.* Therefore the new generic name *Trombiculoides* was proposed, with *Trombidium scabrum* designated as type. His generic diagnosis was based however, on his specimens and not on Say's description. Say's description was disregarded whenever a discrepency arose between the specimens and the description.

Ewing 1946 reported that Jacot had misidentified his specimens and that *Trombidium scabrum* was in reality a species of *Sericothrombium.* Ewing therefore considered *Trombiculoides* a synonym of *Sericothrombium* Berlese, 1910. Furthermore he points out that Howard (1918) had given an excellent account of the species including figures of both larval and adult stages. It is obvious from the descriptions of Howard and Jacot that they are not dealing with the same or even closely related species. On the other hand it is also obvious that Say's description is so incomplete that his name *T. scabrum* might apply to any one of several species in different families, or might refer to a concept that includes a complex of several species.

Jacot's specimens were borrowed from the Museum of Comparative Zoölogy through the courtesy of Dr. Bequaert. A study of the specimens showed that they were compared with specimens of *Eutrombicula alfreddugèsi* Oudemans, 1910 from cultures, and no significant differences between the two could be noted. It is impossible to identify Jacot's specimens as *Eutrombicula alfreddugèsi* at the present time, however, because this species can be

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[1] This paper is a report on work done in connection with a Grant-in-Aid from the Research Grants Division of the U. S. Public Health Service.

recognized as distinct from *Eutrombicula masoni* (Ewing, 1943) only on the basis of larval characteristics.

According to Opinion 168 of the International Commission on Zoölogical Nomenclature, "it is to be assumed that the original author of a genus correctly identified the species assigned by him there to, ... but that, where there is evidence that . . . . (this) assumption(s) is at variance with the facts, the case should be submitted with full details to the International Commission on Zoölogical Nomenclature, and that pending their decision thereon, the genus should be regarded as of doubtful status."

In this case it seems that there is evidence that Jacot misidentified the specimens on which he based *Trombiculoides*. The facts will be presented to the International Commission on Zoölogical Nomenclature. It therefore follows that until the Commission acts, *Trombiculoides* Jacot, 1938 must be considered as of doubtful status.

Fortunately *Eutrombicula* Ewing, 1938, the name now used for the genus that includes the specimens on which Jacot based his *Trombiculoides*, has priority over *Trombiculoides* Jacot, 1938. The date of *Eutrombicula* is 15 June 1938 while that of *Trombiculoides* is 10 October 1938. Therefore no change in the generic names is anticipated in settling the status of *Trombiculoides* Jacot, 1938.

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SEVEN NEW FLEA BEETLES FROM THE WEST INDIES (COLEOPTERA—CHRYSOMELIDÆ)[1]

By Doris H. Blake
Arlington, Va.

This paper contains descriptions of seven new flea beetles from Jamaica, Hispaniola and Puerto Rico in the collection of the Museum of Comparative Zoology at Cambridge. Five of these were collected by P. J. Darlington.

Lactica xanthotrachela n. sp.

Fig. 1

From 3–4 mm. in length, elongate oblong, shining, dark blue or green with yellow head and thorax and deep brown antennæ, mouthparts and legs, hind legs usually with metallic lustre.

Head with interocular space over half its width, shining, smoothly rounded over occiput with a large puncture on either side near eye and obsolete small punctures on front, tubercles more or less distinctly marked, the space between antennal sockets a little produced and rounded; mouthparts dark. Antennæ with slightly paler basal joints, deep brown otherwise, third joint shorter than fourth, remainder subequal. Prothorax not quite twice as broad as long with almost straight sides and deep and very slightly sinuate basal sulcus; surface shining and finely punctate. Elytra more distinctly punctate than prothorax, very shining, green or blue, the humeri well marked by a short intrahumeral sulcus, otherwise the elytra smoothly convex. Epipleura wide but disappearing before the apex. Body beneath lustrous, the pale color of thorax extending down to the coxæ of the middle legs, rest of undersurface lustrous black or with metallic blue color, and finely pubescent. Legs dark, the hind ones, at least, with metallic lustre. First tarsal joint of hind legs long, claws appendiculate. Length 3.1–4.1 mm.; width 1.5–2 mm.

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[1] Published with a grant from the Museum of Comparative Zoölogy at Harvard College.

Type male and 5 paratypes M.C.Z. Type No. 27797. 1 paratype in U.S.N.M. Cat. No. 58723.

Type locality.—Mandeville, Jamaica, collected by A. E. Wright.

Other localities.—Pt. Antonio, Jamaica, collected by A. E. Wright, Dec. 1931; "Jamaica," collected by L. G. Perkins, in the Stuart T. Danforth collection.

Remarks.—In coloration this species is similar to a great many others that occur on the continents both of North and South America, but upon careful comparison I have not been able to find any other species that entirely corresponds with this Jamaica species. For instance, *L. iris* (Oliv.) of North America has pale front and middle legs; *L. elegans* Harold of Colombia has a pale margin on the elytra, *L. semiviolacea* Jac. and *L. mexicana* Jac. and *L. hogei* Jac. are all much larger.

Lactica darlingtoni n. sp.

Fig. 2

From 3–3.5 mm. in length, elongate oblong, shining, deep blue or blue green with black antennæ, legs and undersurface, the two latter often with a blue or green lustre; very finely punctate.

Head with interocular space more than half its width, very polished over occiput and front with a median line between tubercles extending upwards (in one specimen) to end in a small depression in middle of the front; a large puncture on either side near the eye; frontal carina between antennal sockets somewhat produced, rounded. Antennæ scarcely reaching the middle of the elytra, 3rd joint shorter than 4th, the basal joints with a metallic lustre. Prothorax twice as wide as long with slightly curved sides and explanate margin and a well marked basal sulcus, surface polished, very finely punctate. Elytra elongate, the humeri small with a short intrahumeral sulcus and slight transverse depression below basal callosity; surface polished, very finely but distinctly punctate throughout. Epipleura broad, gradually diminishing and disappearing before the apex. Body beneath usually with a metallic lustre, very finely pubescent.

First joint of hind tarsi long, claws appendiculate. Length 3.1–3.5 mm.; width 1.5–1.7 mm.

Type male and 3 paratypes M.C.Z. Type No. 27798. 1 paratype in U.S.N.M. Cat. No. 58724.

Type locality.—Whitfield, Blue Mts., Jamaica, elevation 4500 feet, collected in Aug. 1930 by P. J. Darlington.

Remarks.—In coloration this is similar to *L. violacea* Jac. described from Guatemala and Panama. It differs from that species in being a little more elongate and with extremely fine punctation which is the same throughout, not disappearing at the apex as in *violacea.* The sculpture of the head with its distinctly marked frontal tubercles also appears different, and the sulcus across the prothorax is not sinuate at all but straight.

Lactica porphyrea n. sp.

Fig. 3

From 2.5–3 mm. in length, ovate, shining yellowish or reddish with violet elytra and dark abdomen; only faint traces of a basal sulcus across the prothorax most marked on each side at the limiting ends; elytra distinctly and rather densely punctate.

Head with interocular space over half its width, frontal tubercles and space between the antennal sockets somewhat elevated with a depressed spot or area above the tubercles, the surface of the occiput and front and frontal carina densely and shallowly punctate and alutaceous; a large puncture on either side of front near the eye. Antennæ more than half the length of the beetle, third joint shorter than fourth, remainder subequal and rather heavy. Prothorax fully twice as wide as long with arcuate sides and narrow explanate margin; surface smooth, polished and fairly alutaceous with sparse punctation; across base an ill marked and, in some specimens, very indistinct trace of sulcus, the rather faint limiting depressions at either end the most distinct part of it. Scutellum usually deep reddish brown. Elytra with small humeri and a slight basal callosity, very shiny deep violet, with dense distinct punctation in basal half becoming smoother near the apex. Epipleura wide, gradually diminishing to end shortly before the apex. Body beneath shining yellowish or reddish with dark brown abdomen, very finely pubescent. Hind tibiæ with a short spur, first tarsal joint of hind legs long, claws appendiculate. Length 2.6–2.9 mm.; width 1.5–1.6 mm.

Type male M.C.Z. Type No. 27799 and four paratypes, 1 in the U.S.N.M. Cat. No. 58725.

Type locality.—Mt. Diego de Ocampo, circa 3—4000 ft. elevation, Dominican Republic, collected in July 1938 by P. J. Darlington.

Remarks.—The extremely indistinct sulcus on the prothorax of many of the specimens at first confuses one as to the generic place of this beetle, but *Lactica* seems to be the genus to which it most closely corresponds.

Lactica megaspila n. sp.

Fig. 5

About 3 mm. in length, oblong ovate, shining, yellow brown, antennæ with the outer joints dark, elytra with four large dark spots having a greenish lustre, two at base and the other two at the apex of the elytra.

Head rather deeper brown on the occiput, possibly with aenous lustre in some specimens, densely and obsoletely punctate with a few larger punctures on inner side near the eye; frontal tubercles well marked with a depression above, the space between the antennal sockets a little produced; lower front rather short; interocular space over half the width of the head. Antennæ extending to the middle of the elytra, third joint shorter than the fourth, remainder subequal, the three basal joints paler. Prothorax not twice as broad as long, moderately convex with a wide explanate margin on sides and a clearly marked basal sulcus deepest at limiting ends; surface finely punctate. Elytra shining yellow brown, each with a basal and larger apical spot, the basal spot extending nearly across the base, the apical spot extending from the middle almost to the apex, in the apical spot an aeneous lustre; a short intrahumeral sulcus and depression behind the basal callosity; surface shining, very faintly punctate, a wide explanate margin along the sides. Epipleura wide, gradually disappearing before the apex. Body beneath pale, shining beneath the short pale pubescence; hind tibiæ with small spur, first tarsal joint moderately long, claws appendiculate. Length 3.1 mm; width 1.6 mm.

Type male M.C.Z. Type No. 27800.

Type locality.—Villalba, Puerto Rico, collected by C. M. Matos June 28, 1934, in the Stuart T. Danforth collection.

Remarks.—There are two species from Central America that have somewhat similar markings,—*L. nigromaculata* Jac. with four small basal spots and a large apical spot but with a pale undersurface and pale femora; and *L. variabilis* Jac. which has two basal spots and two apical spots. The second species also has quite differently colored legs.

Pseudoepitrix hottensis n. sp.

Fig. 4

About 2.5 mm. in length, elongate, shining reddish brown, outer joints of antennæ and undersurface deeper brown in color; pronotum densely and rather coarsely punctate.

Head with interocular space half its width, occiput rounded, not very shiny but finely alutaceous, a circle of fine punctures in front and over the indistinct tubercles, a sulcus running from antennal sockets up to eye; antennal sockets situated about midway down front of head, lower front tapering. Antennæ extending to the middle of the elytra, third joint shorter than fourth, last five joints darker. Prothorax not twice as wide as long with only slightly curved and nearly straight sides, having a prominent anterior angle under eye; a well marked and somewhat sinuate basal depression; surface finely alutaceous, somewhat shiny, moderately coarsely and densely punctate. Elytra with the striate punctures coarser in basal half, becoming fine at apex, basal callosities well marked and a transverse impression below them. Body beneath deeper brown, shining, lightly pubescent, legs yellow brown, tibiæ not sulcate, first tarsal joint not so long as the remaining joints together, claws appendiculate. Length 2.5 mm.; width 1.2 mm.

Type male M.C.Z. Type No. 27801.

Type locality.—Desbarriere, Mt. LaHotte, Haiti, about 4000 ft. elevation, collected Oct. 12–14, 1934, by P. J. Darlington.

Remarks.—This is the second species to be described from Hispaniola. *P. hispaniolæ* Blake, described from the Dominican Republic, is more robust with a much more densely and coarsely punctate pronotum, and has a differently shaped ædeagus.

Pseudoepitrix punctatissima n. sp.

Fig. 7

About 2 mm. in length, elongate oblong, moderately convex, shining, very dark reddish brown, almost piceous, with densely and coarsely punctate pronotum and elytra; legs and antennal joints 3–6 and 10 and 11 pale.

Head with interocular space fully half its width; occiput rounded, distinctly punctate, a deeply impressed line straight across front over frontal tubercles joining with a sulcus about inner and upper side of eye; frontal tubercles somewhat elevated; space between antennal sockets narrow, and lower front to labrum short, labrum long and paler in color. Antennæ not reaching the middle of the elytra, joints 3–6 and 10 and 11 pale, outer joints heavier. Prothorax not twice as wide as long, rather convex, with prominent anterior angle under eye and tooth at basal angle, basal margin a little sinuate, a shallow depression along base; anterior margin a little paler reddish brown; surface shining, densely, deeply and coarsely punctate. Elytra with rounded basal callosity and depression below, convex, very shining dark reddish brown, coarsely striate punctate, the punctures near the suture dense and a little confused and at apex becoming fine, on sides next to margin deeply impressed. Epipleura not reaching apical angle. Body beneath shining deep reddish brown, with paler legs. Anterior coxal cavities open, hind tibiæ not grooved, claws appendiculate. Length 2 mm.; width 1 mm.

Type female M.C.Z. Type No. 27802.

Type locality.—Desbarriere, Mt. LaHotte, about 4000 feet elevation, Haiti, collected Oct. 12–14, 1934, by P. J. Darlington.

Remarks.—This species is more convex than the other species of *Pseudoepitrix* from the West Indies, and it has short antennæ and much coarser punctation, which near the suture of the elytra is confused. It may possibly belong to a different genus.

Aphthona fraterna n. sp.

Fig. 6

About 2 mm. in length, ovate, shining reddish brown with yellow antennæ having joints 6–9 black; elytra very finely striate punctate.

Head with interocular space a little more than half its width, smoothly rounded over occiput, frontal tubercles indistinct, a narrow carina from between antennal sockets down to labrum, a lightly impressed line on either side of forehead running up from short sulcus near eye. Antennæ scarcely reaching the middle of the elytra, joints 3 and 4 subequal and shorter than 5, joints 6–9 black. Prothorax not twice as wide as long with obliquely cut anterior angles, only slightly curved, nearly straight sides, and basal margin forming an oblique angle near sides, disk polished, impunctate. Elytra polished, convex, with out depressions, with faintly striate punctation becoming indistinct at apex. Body beneath shining reddish brown, anterior coxal cavities open, hind tibiæ sulcate, with a small spur at apex; claws simple. Length 1.8 mm.; width 1.2 mm.

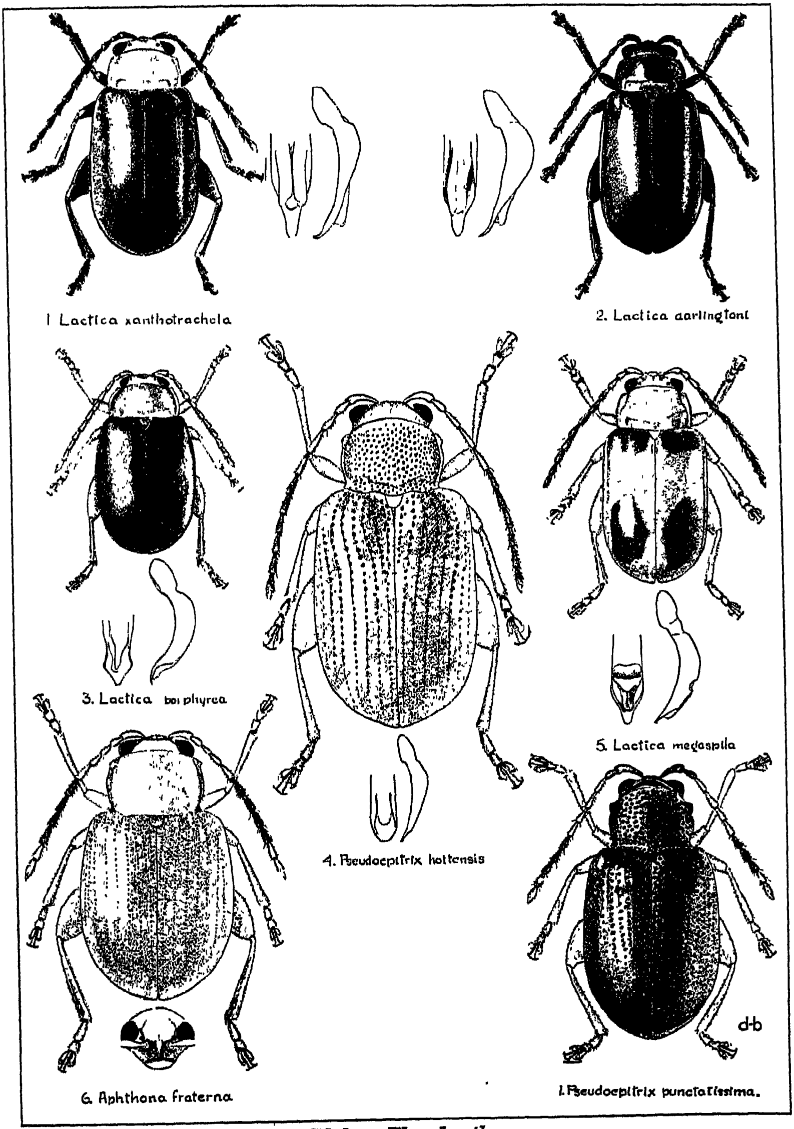
Type female, M.C.Z. Type No. 27803.

Type locality.—Desbarriere, Mt. LaHotte, Haiti, near 4000 ft., collected Oct. 12–14, 1934, by P. J. Darlington.

Remarks.—This species is closely related to *A. insolita* Melsh. from North America and *A. fulvipennis* Jac. from Guatemala. All three are reddish brown beetles having the antennæ pale with the outer joints in part dark. All have very lightly striate-punctate elytra. *A. fulvipennis* from its description appears to resemble *A. insolita* in the sculpture of the head in that the frontal tubercles are elevated. In *A. fraterna* the tubercles are not even distinctly marked and the lower front is excavated with only a very narrow ridge running down the front between the antennal sockets. *A. insolita* has a quite different face, particularly in the lower front. It has also very fine punctures on the pronotum, the antennæ are heavier and the entire beetle is more convex than *A. fraterna*.

Explanation of Plate 14

Fig. 1. *Lactica xanthotrachela*, n. sp.
Fig. 2. *Lactica darlingtoni*, n. sp.
Fig. 3. *Lactica porphyrea*, n. sp.
Fig. 4. *Pseudoepitrix hottensis*, n. sp.
Fig. 5. *Lactica megaspila*, n. sp.
Fig. 6. *Aphthona fraterna*, n. sp.
Fig. 7. *Pseudoepitrix punctatissima*, n. sp.



Blake—Flea beetles

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PSYCHE

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CHRYSOPIDÆ (NOTHOCHRYSIDÆ) COLLECTED IN MEXICO BY DR. A. DAMPF (NEUROPTERA)[1]

By Nathan Banks
Holliston, Massachusetts

Early in 1947 Dr. Dampf sent me a large number of Chrysopidæ, and later a smaller lot. Much of the material was collected in the 1920's, and almost all before 1938; so much of it had been in papers for many years it was fragile. Nearly a thousand specimens of *Chrysopiella sabulosa* were taken in the northern parts of Mexico; it occurs in the dry parts of Colorado, New Mexico and Texas. About half of the rest was taken in or near Mexico City or at least in the Federal District. Of the others the most interesting were specimens from the States of Guerrero and Chiapas; many I had not seen. Dr. Dampf intended to send a third lot, and to collect in the summer of 1947, but sickness, and his unfortunate death induce me to publish on what I have now. As in other cases, I have been greatly helped by the notes prepared by Prof. R. C. Smith on the types of Navas that he examined in his sojourn in Europe.

Genus Chrysopa

Synopsis of species in collection

1—Antennæ beyond second joint black (or very dark) for some distance, often paler before tip 2
Antennæ not darkened beyond the second joint 7
2—Black or reddish stripe or spot on cheeks; palpi pale 3
Cheeks pale, unmarked 4
3—Gradates bordered with brown, inner series not much

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[1] Published with a grant from the Museum of Comparative Zoology.

nearer to outer series than to radial sector; second joint of antenna dark; three forks beyond end of medius before the acute tip of fore-wing, small species *gradata* Navas

Gradates not bordered, and inner series almost twice as near to outer as to radial sector; four or four and one half forks beyond end of medius before the tip of wing, moderately large *lateralis* Guerin

4—Pronotum with a red line or stripe each side (not marginal) broken at the groove into two stripes; on face a dark spot below the basal joint; costal area (fore-wing) broader than the radial; five forks before the acute tip; head very broad *tortolana* n. sp.

Pronotum with an unbroken red line each side at or near margin; no mark below basal joint, costal area not broader than radial area 5

5—Basal joint of antennæ without any spot or line; gradates parallel and inner much nearer to the outer row, wings slender, third cubital cell longer than second . *ceres* Bks.

Basal joint with a dark line or a spot 6

6—Gradates divergent, inner row fully as near to radial sector as to outer row, not bordered, each gradate hardly its length from next; hairs on veins very short *sarta* Bks.

Gradates parallel, inner row much nearer to outer than to radial sector; each gradate usually its length or more from next, small species *berlandi* Navas

7—No dark mark on cheek, nor a band or spots on face . 8

A distinct reddish or darker mark on cheek, sometimes a band on face . 11

8—Basal joint of antennæ without a mark or stripe; palpi lined with dark, last joint dark; no red on vertex *castalia* n. sp.

Basal joint of antennæ with a mark or stripe 9

9—Basal joint with two dark stripes; one continued on vertex for a short distance; palpi pale, last joint partly dark *arioles* Bks.

Basal joint with but one dark stripe or spot 10

10—Almost all cross-veins and the gradates of fore wing very dark; from the third cubital cell but one vein to margin, but four or five inner gradates; two or three forks beyond medius *tolteca* Bks.

Costals and some other cross-veins dark only in middle, from third cubital the usual two veins to margin, six or seven inner gradates, and four or four and one-half forks beyond end of medius before the acute tip; pronotum plainly broader behind than in front; palpi pale *caligata* Bks.

11—A distinct dark or reddish band (or two lunules) across the face just below the base of antennæ, often also a lower band 12

No band across face 16

12—Second joint of antenna black; vertex with two spots in front, sometimes also behind; pronotum unmarked; venation mostly green, costals often dark at ends; five or six forks beyond end of medius before tip or fore wing *mexicana* Bks.

Second joint of antennæ not dark 13

13—Vertex without marks except a red line close to each eye; venation, including gradates, pale; face-marks are red; five forks beyond end of medius before wing-tip; inner gradates near the outer row. *acolhua* n. sp.

Vertex with dark or reddish marks near middle; inner gradates about as near to radial sector as to outer row 14

14—Pronotum without lateral dark stripes; vertex with a red thrice-forked mark; cross-veins mostly brown, divisory cell not twice as long as broad at base; three and a half or four forks beyond end of medius *trifurcata* n. sp.

Pronotum with a dark or black stripe each side; vertex with two parallel lines near middle, sometimes connected in front; lateral lobes of meso- and metanotum more or less rufous; anal veins black for some distance 15

15—Venation (including gradates) largely pale green; pronotal stripes broad, reach side margin. *nahoa* n. sp.

In fore wings many cross-veins (including gradates) black; pronotal stripes slender, not reaching to side margin *tezcucana* n. sp.

16—Pronotum with two red spots each side, separated by the groove, cheek with a red streak from lower inner edge of eye; basal antennal joint quite long; fore wings with the gradates and many cross-veins dark, inner gradates nearer to the radial sector, and more or less divergent from the outer row *bouvieri* Navas

Pronotum not so marked 17

17—Pronotum with two small dark spots in front part; basal antennal joint very short and much rounded on inner side; some red on vertex near antennal sockets; gradates and most other cross-veins dark; pronotum plainly broader behind than in front, reddish on anterior corners *exotera* (?) Navas

Pronotum without two dark spots 18

18—Pronotum with a distinct red lateral stripe each side; palpi partly dark 19

No red lateral stripe on pronotum 20

19—Vertex with a transverse reddish area behind antennæ; each lateral reddish stripe fully its width from the side margin of pronotum; wings not especially slender *quadornia* n. sp.

No reddish on vertex, reddish stripes on pronotum are on the side margin of pronotum; wings noticeably slender, second and third cubital cells more elongate than usual *marginata* (?) Navas

20—Gradates in the front wing plainly dark 21

Gradates in both wings wholly pale green; basal joints of antennæ rather widely separated 22

21—Pronotum broadly green on sides, also lateral lobes of meso- and metanotum; basal antennal joints well separated, short but not much swollen on inner side; cheeks broadly red, palpi partly black; many cross-veins dark *incisa* n. sp.

Pronotum not broadly green on sides; cheeks reddish; last joint of palpi black, gradates dark, most other cross-veins pale *comanche* var. ?

22—Cheeks with a black line or streak, often some red

adjoining; palpi pale *californica* Coq.
Cheeks reddish, usually rather broadly; last joint of palpi black *comanche* Bks.

Chrysopa nahoa sp. nov.

Figures 18, 21

Green; face with two maroon bands; one from just below eyes and across clypeus, the other just below antennæ, this one has an extension from the middle between the antennæ to vertex where it divides and extends laterally as a narrow streak just above antennal sockets to the eyes; the median lobe of vertex has two short parallel red streaks, and there is also a slender red line close to each eye; palpi partly black; antennæ pale, the basal joint rather more red at tip. Pronotum pale in middle and each side with a broad maroon stripe; the meso- and metanotum are pale in middle and broadly pale reddish on the lateral lobes; the abdomen has a narrow maroon stripe on each side. The pronotum is almost as long as broad behind, and about one-third narrowed in front.

In the fore wing the subcosta is black to beyond the divisory cell, and many costals dark at one end; the first and second anal veins are also dark (maroon), and their branches are dark on base; elsewhere the venation (including gradates) is largely greenish; the costal area is not as broad as the radial area; the divisory cell ends beyond cross-vein, both sides convex; there are nine cubitals beyond end of divisory cell. In fore wing there are eight outer and seven inner gradates, in parallel rows, inner scarcely nearer to outer than to the radial sector, the first four of inner series disjoints the sectorals a little; in the hind wing there are seven gradates in each row, parallel, and the inner toward end nearer to radial sector than to outer row. The radial area is only a little broader than the costal area, the costals numerous, twenty-five before the stigma, beyond the last there are none in stigmal area, but six in the subcostal area. The cubital area is about two thirds of the marginal area. In hind wing the costal cells are much longer than high. The hairs on all veins are rather short.

Length of fore-wing, 14 mm., width 4.3 mm.

One from La Venta, southwest of Mexico City, 2800 m. alt., forest, 22 May.

Type: M.C.Z. no. 27994.

Chrysopa mexicana Bks.

Figures 13, 17, 20, 37

The venation is largely green; there are twenty-four costals, dark at upper end; the fourth and fifth slightly sinuous; eight inner gradates, nine outer, parallel, inner much nearer to outer than to radial sector; costal area about as broad as radial, cubital area about two-thirds of marginal area; in hind wing six inner and seven outer gradates, placed as in fore wing. In both wings several of the sectorals are bent by the inner gradates; in fore wing six forks beyond end of medius before the wing-tip. Palpi lined and last joint almost wholly black; the hairs on veins are quite long and reach half way across the slender costal cells.

From Presa San José, San Luis Potosi, 23 November.

Chrysopa acolhua sp. nov.

Figure 5

Face with a reddish lunule under base of each antenna; a narrow, reddish band below from under each eye and across base of clypeus, latter with a reddish spot each side; palpi mostly pale, but marked with dark; antennæ pale, basal joint in front with an elongate reddish streak or triangle on the lower part; vertex with a red border each side close to eye, and a more narrow border to upper side of the antennal sockets, united to form an acute angle between antennæ. Pronotum much broader than long; each side is broadly reddish brown, leaving a much more narrow pale median area; thorax and abdomen without markings (but possibly with some when fresh).

Wings long and moderately slender, venation pale, stigma scarcely darkened; costal cells on basal half of wing not numerous, and few, if any, twice as high as long, 20 costals before stigma, last four very short; divisory cell ends a little beyond cross-vein, fully twice as long as broad, six cubitals beyond; in fore wing eight outer and five inner gradates, in hind wing seven outer and four inner, in both wings the inner row is much nearer to the outer than to the radial sector, at junctions the sectorals are slightly disjointed; costal area plainly not as broad as radial area; cubital area as broad as marginal area except toward base of wing.

Fore wing length 13–15 mm., width 3.8–4.2 mm.

Type, from Pungarabato, Guerrero, Mexico (Jose Paner), 22 August.

Type: M.C.Z. no. 27997.

This species in many ways agrees with the description of *C. varicosa* Navas, but Navas says the inner gradates are arcuate, and the Smith Notes, "bowed up". Here the inner gradates parallel to the outer. Two specimens from El Mante, Tamaulipas have the venation almost the same, but the cubital area is not so broad in proportion to the marginal area; the wings more slender, fore-wing 14 mm. long, width 4.6 mm.; the two lunules under antennæ of the typical form here form a band, barely broken in middle; I presume they are a form of the same species.

Chrysopa tezcucana sp. nov.

Figures 7, 11, 28, 31

Pale greenish; face with a rather broad maroon band below bases of antennæ, a zigzag black stripe under each eye, between are two pairs of rounded dark areas; a narrow dark stripe between bases of antennæ which forks on the vertex, but the forks soon become parallel; on each side of the pronotum is a red stripe, well separated from the margin, this stripe extends back on the lateral lobes of meso- and metanotum. Wings with green venation, the bases of the first and second anal veins are black; the costals are black, twenty before the stigma, the cells higher than broad, the third or fourth costal is more or less sinuous; bases of radial sector and of discoidal cell black, most of the radial cross-veins black, except ends, the cubitals and gradates also black. Six cubitals beyond the divisory cell, latter about three times as long as broad; five or six gradates in each series, nearly parallel, and the inner nearer to radial sector than to the outer row; radial area much broader than costal; the cubital area about two-thirds of the marginal area. In hind wings five or six gradates in each row, about parallel, and inner nearer to radial sector than to the outer row; the inner row disjoints the sectorals in both front and hind wings; the costal cells much longer than high.

Length fore-wing 14.8 mm., width 3.4 mm.

Type from Lomas de Chapultepec, Mexico City, Mexico 8 August, also Cuernavaca, Mexico City, 26 April, the latter are a little smaller.

Type: M.C.Z. no. 27993.

Chrysopa trifurcata sp. nov.

Figures 1, 2, 32

Head pale, with pale red marks on face and vertex; face broad, a narrow band below antennæ, making two curves, a broad red spot below each eye; in middle a transverse mark rounded above and with two projections below, enclosing a median pale spot. On vertex a mark starting between the antennæ, giving off each side a streak to margin upper edge of antennal sockets, shortly behind the median streaks forks again, and each fork gives off a branch to the eye, the fork still curving outward and reaching the hind border, each end being fully twice as near to eyes as to each other.

The pronotum shows no definite markings, but the lateral lobes of mesonotum are partly suffused with reddish and some faint reddish in some of the grooves. Abdomen dark above (possibly reddish alive).

Wings with pale veins; in fore wings the gradates and many cross-veins pale brown, some almost margined. Costal area almost half as broad as radial area; 18 costals before stigma, none sinuous, cells about as long as high; divisory cell is very broad, not twice as long as broad, the oblique base occupies about three-fourth of the cross-vein. From the third cubital cell there is but one vein behind, but it forks, equally in both wings, only one branch behind from the fourth cell; six cubitals beyond end of divisory cell. In fore wings five gradates in each row and almost parallel, but both rows slope upward more than usual, the inner row much nearer to radial sector than to the outer row; the inner gradates strongly disjoint the sectorals; the median vein ends further out on margin than usual, the end being as far out as the end of the stigma.

In hind wing there are four gradates in each row, the inner row much nearer to radial sector than to outer row, and also strongly disjointing the sectorals, the costal cells are mostly twice as long as high.

Length of fore wing 12.5 mm., width 4.1 mm.

From Navojoa, Sonora, 24 March, 1927.

Type: M.C.Z. no. 27995.

The marks on vertex resemble those given by Navas for his *Leucochrysa delicata;* but *trifurcata* is not a Leucochrysa; the face has various red marks; Navas says head etc. "subtota fusca." moreover he figures the pronotum broader behind, in *trifurcata* the sides are parallel.

Chrysopa bouvieri Navas

Figures 16, 20

From Vergel, Chiapas 18, 30 May, 3 June; Finca Germania, Chiapas, Sierra Madre del Sur, 20 June; Coffee Plantation, Sierra Madre del Sur, Chiapas 11 May; Esperanza Plantation, Sierra Madre del Sur, Chiapas, 5 March, all in forest.

The red of the anterior spots usually extends forward onto the vertex as a line near each eye. Costal area very broad near base, equal to the radial area; 19 to 22 costals, the third usually slightly sinuous; three to four inner gradates and about eight outer, the inner more or less divergent and generally nearer the radial sector, first of inner gradates bends the sectoral at juncture; divisory cell full twice as long as broad; cubital area hardly two-thirds of marginal area. I believe that *yucatanensis* and *divergens* are synonyms.

Chrysopa tortolana sp. nov.

Face pale, no cheek mark, but a dark spot below each basal joint close to the socket, some irregular dark spots on basal joint and four to six joints beyond black (except second joint), beyond this some joints dark on one side; palpi pale; vertex and basal joints above faintly pink.

Pronotum with a narrow red line on each side of front part, and a shorter red line on posterior part, much more than its width from lateral margin, rest of thorax very pale yellow. Venation green; gradates black, several of the longer radials dark near upper end, but not at end; some of the longer costals marked the same.

Basal joint of antennæ very short and small; pronotum a little broader than long in middle, sides nearly parallel. Wings rather broad; costal and medial areas both very broad at widest part, but the costal plainly the broader; eighteen costals, none sinuous; marginal area much broader than cubital, in fact almost twice as broad beyond the third cubital cell; third cubital cell as long as and broader than the second; divisory cell about twice as long as broad; six cubitals beyond; medius ends far before tip, full five forks before the tip.

In fore-wing six inner and seven outer gradates, each gradate well separated from next; rows not parallel, the inner as near radial sector or nearer toward end than to the outer row; in hind wing four inner, six outer gradates, inner nearer to radial sector for most of length; in hind wings all veins green.

Length of fore-wing 14 mm., width 4 mm.

One from Vergel, Chiapas, 4 June, at light.

Type: M.C.Z. no. 27998.

This species resembles *Ch. tetrasticta,* but the antennæ are black for a short distance and partly black for a greater distance, also the black on face, and the cross-veins not clouded separate it; the red marks on pronotum are more slender than in *tetrasticta.*

Chrysopa arioles Bks.

Figures 6, 21

From Esmerelda, Chiapas, Sierra Madre del Sur; Vergel, Chiapas, 18 May; El Dorado, Sinaloa, 23 Jan. and Matemorelos, Nuevo Leon, 3 Jan.

The divisory cell is very slender; costals 16 to 18, costal area hardly as broad as radial area, the third or fourth costal is plainly sinuous. There is no mark on the cheek, the antennal sockets are usually margined with red, the inner stripe on basal joint is continued back on the vertex.

Chrysopa caligata Bks.

From Vergel, Chiapas, 29 May, 17 May, 22 May, 1, 4 June; Esmerelda, Chiapas, Sierra Madre del Sur, 11 May.

The divisory cell is much like that of *arioles,* but often a little broader; about 18 to 20 costals, the third or fourth is sinuous; there is ordinarily no mark on cheek nor face, but one of the Vergel specimens has a black streak from eye toward mouth, ending in a slender point on clypeus; the basal joint of antennæ is wholly black (instead of the two black marks); in this specimen and several of the others the gradates are faintly bordered with brown; the marks on basal joint in these usually black, or almost so.

Chrysopa tolteca Bks.

Figure 27

From Centinella, Colima, 28 Jan., El Mante, Tamaulipas, 7 Aug., Villa Hermosa, Tabasco, 14 June, 13 Aug., Navojoa, Sonora, 24 March, Vergel, Chiapas, 12 May, Frontera, Tabasco, 7 June.

The costal area is not nearly as broad as radial area, 14 to 15 costals, the third or fourth often a little sinuous; practically all the cross-veins and the gradates of fore wing are black. In hind wing the gradates dark, most other veins pale; the costal cells fully twice as long as broad. In neither wing do the gradates bend the sectorals; the third cubital cell has but one branch to the hind margin, the next cell has two. The numerous specimens I have seen have but one branch to the hind margin.

Chrysopa santa Bks.

Figure 15

One from Vergel, Chiapas, 12 May, 1935.

It has but one marginal vein from the third cubital cell, and that from beyond the middle of cell. The costal area is not quite as broad as the radial area; about twenty costals, none plainly sinuous; all the costal cells before the middle of wing are higher than broad, some twice as high. The inner gradates start from near the penultimate cubital and plainly diverge from the outer row; beyond end of medius there are four marginal forks before the acute tip; the cubital area is fully two-thirds of the marginal area.

Chrysopa berlandi Navas

From Esmerelda, Sierra Madre del Sur, Chiapas, 11 May 1937, and several from Vergel, Chiapas, 22, 23, 29 May, 4 June.

There are about seventeen costals, the third or fourth a little sinuous; the costal area plainly less broad than the radial. The gradates in parallel rows, the third cubital cell much narrowed at base. The cubital area is but little more than half the marginal area; three forks beyond end of medius before acute tip.

Chrysopa gradata Navas

One from Vergel, Chiapas, 17 May, 1 June, at light. It is much like *berlandi*, but with a distinct black stripe on each cheek.

The second vein from the third cubital cell to margin is (or almost) interstitial with the end of the third cubital cell; just as it is in *berlandi*.

Chrysopa everes Bks.

One from Vergel, Chiapas, 28 May, at light.

The first and second joints of antennæ are wholly pale rufous, without marking. This has a very short face; seen from the side the part in front of eye is not quite as long as the eye. The wings are longer and more slender than in *C. berlandi.*

Chrysopa lateralis Guerin

Figure 22

One from Esperanza, Chiapas, 14 June, another from Vergel, Chiapas, 31 May.

Pronotum with a reddish stripe each side, a short distance from margin; costals (19) and gradates in fore wings all dark, other venation mostly pale greenish; three inner and seven outer gradates, parallel, and inner row much closer to outer than to radial sector, sectorals not bent by gradates; divisory cell fully three times as long as broad, both sides curved, ends beyond cross-vein; six cubitals beyond. Costal area not quite as broad as radial; no costal cells twice as high as broad; cubital area not quite so broad as marginal area. In hind wing venation pale, three inner and six outer gradates, parallel and inner near the outer.

Chrysopa incisa sp. nov.

Figure 8

Head, thorax, legs, antennæ pale, under the eye there is an elongate, reddish stripe, without any inner reddish streaks, more like *californica*, but not black; palpi pale, darker at tip, lower end of head in two divergent points. Pronotum green, with a white stripe along the middle, and extending onto mesonotum; pronotum about as long as broad, sides nearly parallel, lateral lobes of meso- and metanotum green; abdomen of male with a pale median stripe above, with white hairs.

Wings with venation pale green, few darkened veins, and then at one end. Radial area hardly broader than costal area, 20 costals, third and fourth sinuous; second and third cubital cells about equal, divisory cell ends just before cross-vein, cell about two and one-half times as long as broad, six cubitals beyond; cubital area hardly two-thirds the width of marginal area. In fore wing six or seven outer gradates, and three of four inner ones, inner about one-half way between, the first inner bends the sectoral, others but little.

In hind wings five outer and four inner gradates, inner about one-half to radial sector; the costal cells very much longer than high.

Length of fore wing 11.5–13. mm., width 3.8–4. mm.

From Ciudad Juarez, Chihuahua, Mexico, 4 June 1927, and Hermosillo, Sonora, 23 March 1927.

Type: M.C.Z. no. 28000.

Chrysopa quadornia sp. nov.

Figures 23, 36

Thorax, legs, antennæ pale yellowish, head somewhat suffused with reddish, broadly red below eye, palpi almost wholly black, vertex with a transverse reddish area above antennæ, lower face at end only slightly emarginate. Pronotum with a reddish stripe on each side, not near margin, posterior portion with a transverse reddish streak.

Wings with pale green venation, some costals, radials, cubital cross-veins, and gradates darkened in middle or at one end, but none really black, the gradates darkest. Radial area a little broader than costal; radial sector not strongly curved, 20 costals, third and fourth plainly sinuous, cells rather high, but few twice as high as broad; divisory cell ends much before the cross-vein, about two and one-half times as long as broad, base full half of cross-vein; six cubitals beyond the divisory. Six or seven gradates in each row in fore wing, rows parallel, the inner row almost as near radial sector as to outer row, first of inner row plainly bends the sectoral; second cubital cell scarcely as long as third; cubital area about two-thirds of marginal area.

In hind wing four inner and six outer gradates, placed as in fore wing; a few costal cells about twice as long as broad, but mostly shorter.

Length of fore-wing 12.2 mm., width 3.5 mm.

One from Acapulco, Mexico, 19 Dec. 1924.

Type: M.C.Z. no. 28001.

Chrysopa castalia sp. nov.

Figures 4, 30

Head, thorax, antennæ pale yellowish, no marks on head; the outer side of the last two joints of palpi is black; antennæ wholly pale, basal joint short, tapering above, third fully twice as long as broad; vertex not as broad proportionally to eyes as in *californica* or *comanche.* Pronotum narrowed in front, behind about as long as broad, the hind border strongly convex, an elevated transverse ridge in front of the groove.

The venation is mostly greenish; a couple of cross-veins near base, the gradates in both wings are dark, also the last cubital cross-vein. There are 21 costals, the fourth, fifth, and sixth sinuous; the divisory cell is about two and one-half times as long as broad, both sides convex, and ends just beyond the cross-vein. Costal area not quite as broad as radial area, the first section of radial sector curved. Second cubital cell a little longer than third, six cubitals beyond the divisory cell; gradates parallel, five inner, seven or eight outer, inner a little nearer to outer than to radial sector, first inner plainly bends the sectoral, other much less; cubital area fully two-thirds of the marginal area, veins sparsely haired, but hairs fairly long.

In hind wings seven outer and five inner gradates, inner ones fully as near to radial sector as to outer.

Length of fore wing 14. mm., width 4. mm.

One from Santa Engracia, Tamaulipas, 3 Febr. 1936.

Type: M.C.Z. no. 28002.

Chrysopa exotera Navas

Figures 10, 24

One specimen from Cuernavaca, Morelos, 20 Febr. 1933, seems to agree with the description; face marks much as in *C. comanche,* but practically all cross-veins black or dark. In this specimen the two submedian depressions on the front part of pronotum are almost black.

Chrysopa marginata Navas(?)

Figure 19

Several specimens of this delicate form with the distinct red margins of pronotum; it has the check mark much as in *comanche,* but the wings are more slender.

Hacienda Nainari, Sonora, 10 August, in the desert; El Dorado, Sinaloa, 23 Jan.; Cuernavaca, Morelos, 2 March; and Ayotzinapa, Guerrero, 14 Jan. 1941. Navas gives a very brief description of *marginata* as a variety of *C. externa;* not enough for certainty.

Chrysopa comanche var.

About 6 specimens are like *comanche,* but the gradates distinctly dark. Hacienda Nainari, Sonora, 15 Aug. 1927, desert; Lomas de Chapultepec, 27 June, 1942, and four from Santa Engracia, Tamaulipas, 2, 3, 20, 25, February, 1936. Two other specimens from Santa Engracia, 3 February, 1936, have green gradates and appear typical *comanche.*

Chrysopa comanche Bks.

This is a very common species. San Jacinto, Mexico City, 3 Febr. 14 March, 2, 8, 24 May, 4, 7, 12, June, 23 July; Cuernavaca, 29 March, 7 April; Torreon, 6 July; Montemorelos, Nueva Leon, 3 June; Hacienda Buenavista, Coahuila, 10 June; Hacienda Fresno, near Torreon, 11 June; Hacienda Nainari, Sonora, 10, 15 Aug; La Barca, Jalisco, 20 May; Los Tablas, S. L. Potosi, 11 Oct., 23, 29 Nov.; St. Engracia, Tamaulipas, 3 Febr.; Jalapa, Vera Cruz, 20, 24 March; San Miguel Totolapan, Guerrero, 15 Aug.; Ayotzinapa, Guerrero, 14 Jan.; Acapulco, Guerrero, 19 Dec.; and Villago Arista near Arriaga, Chiapas, 24 May.

Chrysopa californica Coq.

Figures 3, 35

More common than *C. comanche.* San Jacinto, Mexico City, 2, 4, 8, 9, 24 May; 4, 7, 12, 20, 21, 22, June; 23, 27 July; 11 Aug.; 18 Oct.; 16 Nov.; 14 March; Torreon, Coahuila, 19 June; Hacienda Santa Barbara, 16 July; Saltillo, Coahuila, 10 June; Santa Engracia, Tamaulipas, 3 June, 13 April; Granja Rodriguez, Nueva Leon, 6 June; Presa San José, S. L. Potosi, 23 Nov.; Hacienda Fresno, Torreon, Coahuila, 11 June; Hacienda Buenavista, Coahuila, 10 June; Navajoa, Sonora, 24 March; and Ciudad Juarez, Chihuahua, 4 July.

Genus CHRYSOPIELLA

Chrysopiella sabulosa Bks.

Figures 25, 26

The front of the basal joint of antennæ is usually wholly black, but sometimes with two parallel stripes, face with two submedian black dashes, stripe on cheek ending with a black dash, upward. About 15 to 22 costals, the third or fourth slightly sinuous; the radius extends far beyond end of subcosta so there are several (four or five) cross-veins from radius to margin; costal area not quite as broad as the radial area, radial sector for much of its length parallel to radius. The divisory cell is more than twice as long as broad, ends beyond the cross-vein, sometimes at end of second cubital cell; cubital area at widest not two-thirds of marginal area at widest part, both narrowed to tip; there are four or five outer gradates, rather widely separated; in hind wing five to six outer gradates; in fore wing the sectorals are curved, in hind wing several are sinuous.

One specimen has two inner gradates in fore wing, near the radial sector.

It is extremely common in northern parts of Mexico, and in desert regions in central and southern Mexico.

From Palomas, S. L. Potosi, 12 Oct.; Los Tablas, S. L. Potosi, 11 Oct.

Genus EREMOCHRYSA

Eremochrysa punctinervis Mc Lach.

Saltillo, Coahuila, 10 June; Hermosillo, Sonora, 23 March; Lomas de Chapultepec, Mexico City, 23 Sept., 10 July, 6, 8 Aug.; Montemorelos, 3 June; Presa San

José, San Luis Potosi, 23 July, 23 Nov.; Granja Rodriguez, Neuva Leon, 6 June; Hacienda Nainari, Sonora, 15 Aug.; Torreon, Coahuila, 6 June; Ciudad Juarez, Chihuahua, 14 July.

Eremochrysa hageni Bks.

From Bejuco, Guerrero, 3, 4 Sept.; Cuernavaca, 8 April.

Genus NODITA

The few species present in this collection can be separated by the following table.

1—Fully thirty costals before stigma; many costal cells more than three times as high as broad; about ten cubital cross-veins beyond the divisory cell; part of the radial sector dark; cubital area hardly one third the width of marginal .... *alloneura* Bks.
Few, if any, more than twenty costal cross-veins; few, if any, costal cells more than three times as high as broad; six to eight cross-veins beyond the divisory cell; cubital area nearly one-half or more of marginal area 2
2—A black spot on base of fore-wings 3
No such spot; but spots on side and ends of mesonotum 4
3—Costal area very broad near base, plainly a little broader than the radial area; inner gradate series starts at the penultimate cubital cross-vein .... sp.
Costal area not as broad as radial area; inner gradate series starts much beyond the penultimate cubital cross-vein .... *punctata* Bks.
4—Antennæ wholly pale .... *antennata* Bks.
Antennæ from second segment out dark for ten or more joints .... *maculata* Navas

Nodita antennata Bks.

From Indian Village, Zoagochi, Sierra Juarez, Oaxaca, 24 June (Francisco Reyes coll.).

Nodita maculata Nav.

From Vergel, Chiapas, 18 May; Villa Tabasco, 16 June.

Nodita punctata Bks.

From Yagalaxi, Sierra Juarez, Oaxaca, 29 Dec.; Vergel, Chiapas, 21, 26 May. *Chrysopa salleana* Nav., according to the Smith Notes, appears to be a synonym.

Nodita alloneura Bks.

From Esperanza, Chiapas, 30 May.

Genus LEUCOCHRYSA

Leucochrysa pretiosa Bks.

From Vergel, Chiapas, 19 May.

Genus MELEOMA

Hagen (1861) described a *Chrysopa innovata* from Mexico. The type is in the Berlin Museum; I saw it in 1912, and noted it was a Meleoma, with a process between and below antennæ shorter than in our northern *M. signoretti.*

Banks (1899) described *Meleoma mexicana* from Mexico City, and later placed it (incorrectly) a synonym of *innovata.*

Navas (1914) described *Chrysopa dolichartha* from Guatemala; a female with extremely slender basal joint of antenna. The Smith notes say it is a Meleoma.

Navas (1928) described *Meleoma titschacki* from Costa Rica.

In the Dampf material are two species, both taken in Mexico City, two males and four females. The two males differ in the structure of head; one male and two females have a pair of short parallel red lines near the center of vertex. Navas says of *titschacki* that a "stria sanguinea longitudinali in vertice et occipite juxta oculos." The *dolichartha* has a much more elongate basal antennal joint than in any I have seen. So both of the Navas names do not apply to the Dampf material.

M. mexicana and the two species in the Dampf material are readily separated in the male by several characters. *M. mexicana* has two rather slender pointed horns from between the bases of the antennæ; the front of head (seen from side) is much sloping above; the others have the tip more vertical; in one (*hageni*) there are two small truncate, hairy plates between the antennæ, and the anterior lobe of head has a tuft of hair above; in the other (*colhuaca*) there is a small process, with a trilobed tip between the antennæ, and the basal antennal joint has a large lobe at inner base, bilobed above, and in the fore wing most of the radial cross-veins are swollen in the middle. The female of *hageni* has two short reddish stripes on the middle of vertex; I am not sure of the females of the two other species.

Meleoma hageni sp. nov.

Figures 12, 33

Pale greenish; face with a black streak from eye to mouth; last joint of palpi largely dark, lower side of basal joint of antenna reddish; the median lobe of vertex with two short parallel reddish stripes, not near the eyes; sides of pronotum slightly yellowish brown, a reddish brown mark on each side of anterior lobe of mesonotum. Wings with greenish venation, the gradates and costals of fore wings wholly black, sectorals, cubitals, and some other cross-veins dark at ends, branches from cubitus to hind margin remain green; in the hind wings the gradates and costals dark, most other venation pale.

Seen from the side the head of the male is short, the end blunt, on the part near to antennæ there is an erect median hairy process; the portion extending down from between the antennæ ends in two short, broad flat pieces, the outer corner of each projecting more than the rest. Each basal joint of antennæ is hollowed out in front, leaving a lobe at base and tip, this under surface is reddish; the median lobe of vertex is very broad.

Pronotum somewhat broader behind than in front, and in front a little broader than long.

The female has the same dark streak in cheeks, the palpi dark on outer side, the two short reddish lines on vertex (in some specimens faint or absent); antennæ pale, but in some with a faint reddish transverse mark on the front of basal antennal joint.

In the wings (both sexes) the divisory cell is about two and one-half times as long as broad, and ends beyond the cross-vein, the base occupies fully one-half of the cross-vein, seven cubitals beyond divisory cell, mostly oblique; gradates nine in each row, rows parallel in fore wing, in hind wing seven inner, eight outer row, in both wings the inner row is about as near to radial sector as to outer row; costal area not as broad as radial area, cubital area little more than one-half of marginal area, branches of cubitus sloping; about 25 or 26 costals, the fifth slightly sinuous.

Length of fore-wing ♀ 17. mm., width 6. mm.

From Lomas de Chapultepec, Mexico City, 25 July, 4, 15, 22, 27, Aug., 22 Oct. The wings of the only male are crumpled, and probably about 14 mm. long.

Type: M.C.Z. no. 27996.

Meleoma colhuaca sp nov.

Figures 9, 14, 29, 34

Male. Face, vertex, pronotum, greenish; thorax green on sides with a pale yellowish median stripe; vertex of head swollen, yellowish; abdomen dull green, venation also, many cross-veins at least partly black, tips of palpi black. Head similar to *M. mexicana,* the swollen front part with short erect hairs above; the antennæ very widely separated, the basal joint crowding the eye, near the inner base of each basal joint is a rounded lobe, the upper part plainly bilobed, between the two is a slender projection forward from the vertex downward, elongate, and faintly trilobed at tip. The basal joints are short, enlarged at tip, without elongate impression on lower inner side, but a slight impression on outer side where it rests against the eye. The vertex is swollen, roundedly triangular, the occiput is reddish. The pronotum is broadly dark green on each side, and pale yellowish in middle; the green (somewhat paler) extends over the lateral lobes of meso- and metanotum; the pronotum is much broader than long, the sides parallel, but close to head narrowed.

The wings are fairly long and slender; the gradates, costals, and some basal cross-veins black, many others dark at ends; the divisory cell ends at or near the end of the third cubital cell, it is about three times as long as broad, the base occupying one-half of base-vein; seven cubitals beyond end of divisory cell. About ten gradates in each series in the fore wing, sectorals scarcely bent by the gradates; in the hind wing nine inner and ten outer gradates; in both wings the rows are parallel and the inner row about as near radial sector as to the outer row.

The radial area is much broader than costal area; about thirty costals, the fifth sinuous; about fifteen radial cross-veins, in all, except the first two or three, the vein is swollen except at ends; likewise most of the sectorals are also swollen; the venation is densely haired, the hairs mostly fairly short, the costals however are not so thickly haired. The cubital area is about two-thirds of the marginal, both cubitals and marginals oblique; about twenty-eight costals, the fifth sinuous.

Length of fore wing 16 mm., width 5.6 mm.

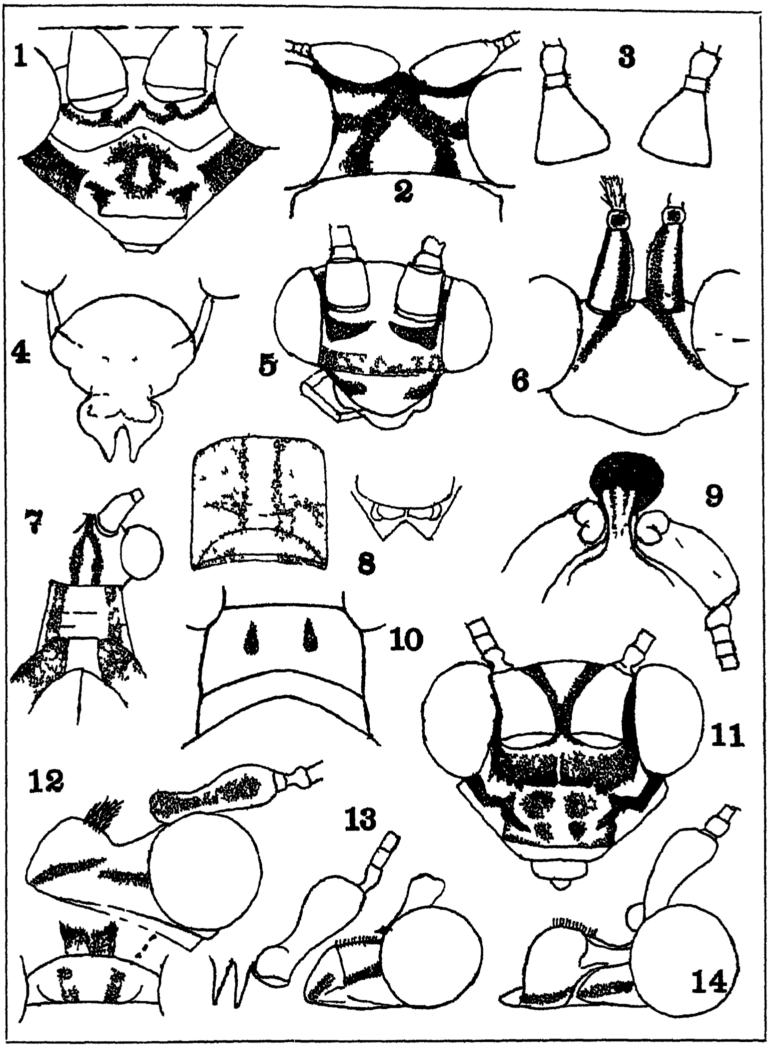
One from Lomas de Chapultepec, Mexico City, 23 June.

Type: M.C.Z. no. 27999.

EXPLANATION OF PLATE 18

1. *Chrysopa trifurcata*, face.
2. *Chrysopa trifurcata*, vertex.
3. *Chrysopa californica*, basal antennal joint.
4. *Chrysopa castalia*, lower part of face.
5. *Chrysopa acolhua*, face.
6. *Chrysopa arioles*, vertex.
7. *Chrysopa tezcucana*, vertex, pronotum, mesonotum.
8. *Chrysopa incisa*, pronotum, left; lower part of face, right.
9. *Meleoma colhuaca*, basal antennal joints, and interantennal process.
10. *Chrysopa exotera*, pronotum.
11. *Chrysopa tezcucana*, face.
12. *Meleoma hageni*, side of head, and interantennal process.
13. *Meleoma mexicana*, side of head, and interantennal process.
14. *Meleoma colhuaca*, side of head.

PSYCHE, 1948 VOL. 55, PLATE 18

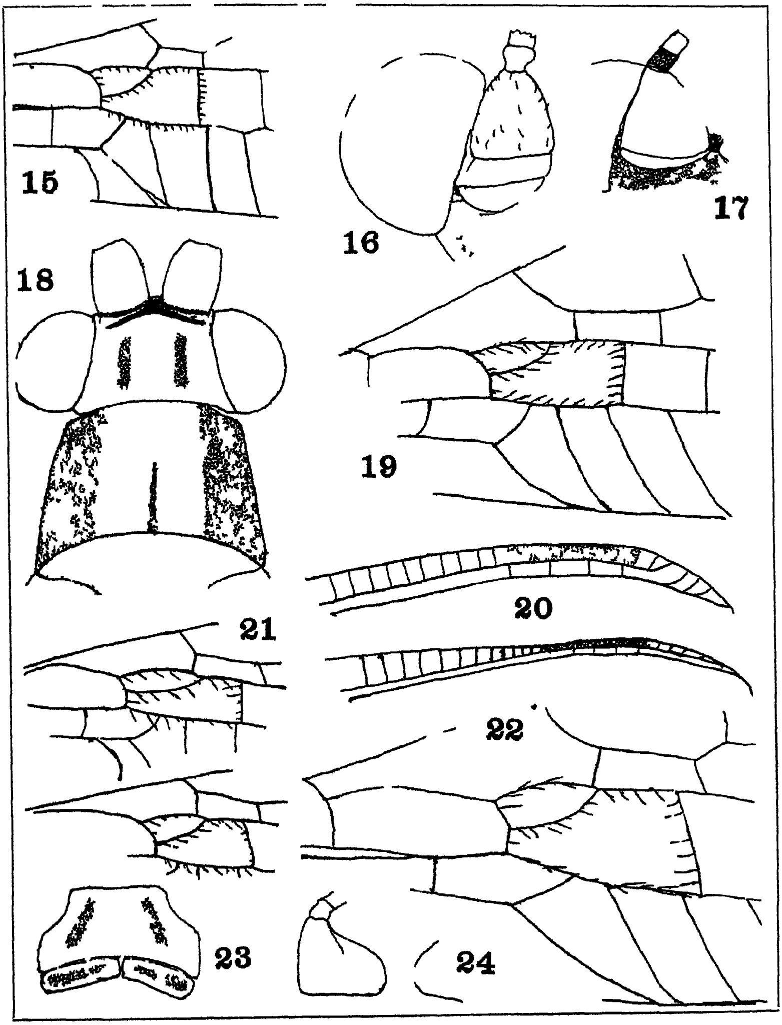


BANKS—CHRYSOPIDAE

EXPLANATION OF PLATE 19

15. *Chrysopa sarta,* venation near divisory cell.
16. *Chrysopa bouvieri,* basal antennal joint.
17. *Chrysopa mexicana,* basal antennal joint.
18. *Chrysopa nahoa,* vertex and pronotum.
19. *Chrysopa marginata,* venation near divisory cell.
20. Costal area at stigma, above *C. mexicana,* below *C. bouvieri.*
21. Venation near divisory cell; above *Chrysopa arioles,* below *C. nahoa.*
22. *Chrysopa lateralis,* venation near divisory cell.
23. *Chrysopa quadornia,* pronotum.
24. *Chrysopa exotera,* basal antennal joint.

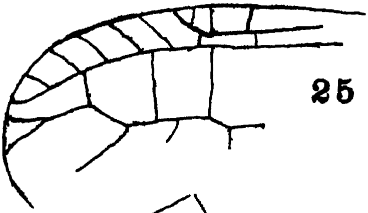
PSYCHE, 1948 VOL. 55, PLATE 19



BANKS—CHRYSOPIDAE

EXPLANATION OF PLATE 20

25. *Chrysopiella sabulosa,* venation near apex of fore wing.
26. *Chrysopiella sabulosa,* venation near divisory cell.
27. *Chrysopa tolteca,* venation near divisory cell.
28. *Chrysopa tezcucana,* basal antennal joint.
29. *Meleoma colhuaca,* swollen radial cross-veins.
30. *Chrysopa castalia,* basal antennal joints, and two beyond.
31. *Chrysopa tezcucana,* venation near divisory cell.
32. *Chrysopa trifurcata,* venation near divisory cell.
33. *Meleoma hageni,* venation near divisory cell.
34. *Meleoma colhuaca,* venation near divisory cell.
35. *Chrysopa californica,* anal area of fore wings.
36. *Chrysopa quadornia,* basal antennal joint.
37. *Chrysopa mexicana,* side of head.



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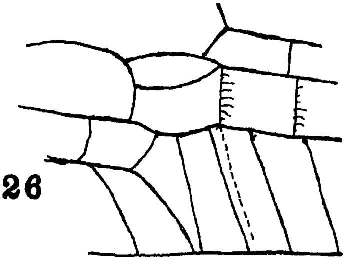

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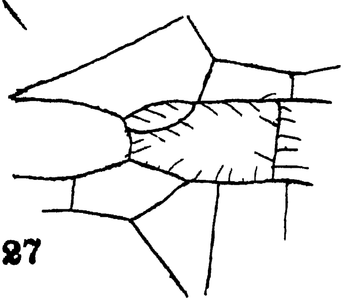

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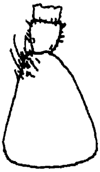

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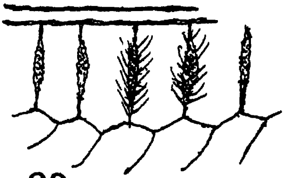

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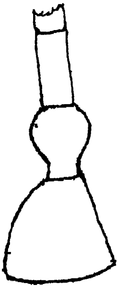

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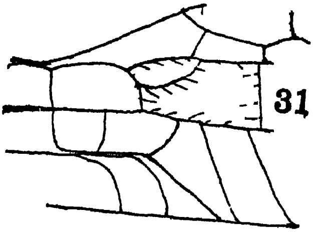

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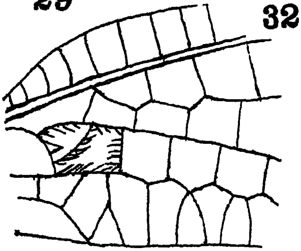

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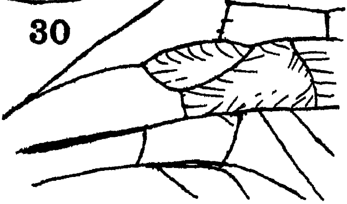

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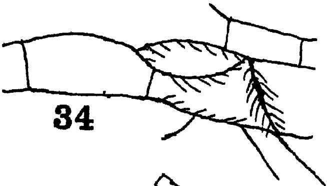

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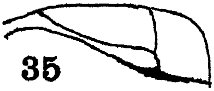

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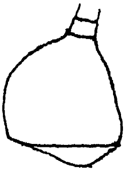

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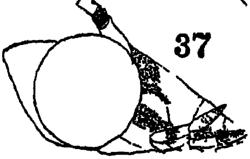

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BANKS—CHRYSOPIDAE

HOVERING MALES OF *HYBOMITRA CINCTA* (FABRICIUS) (DIPTERA, TABANIDÆ)

By Norman S. Bailey
Boston University

In a recent paper (Annals, E.S.A., December, 1948) I reviewed the literature dealing with the hovering and mating of Tabanids. The observations recorded in this item corroborate the opinion then expressed that hovering is primarily a male activity among the horseflies. Brimley and Sherman (1908) had previously noted the males of this species so engaged. The following data reveal some of the conditions under which *Hybomitra cincta* (Fabr.) hovers.

During the 1948 season I was regularly in the field from early June until October. On July 7th I was pleased to observe and net a hovering male of *Hybomitra cincta* at a station that I had recently discovered to be of considerable entomological interest in other respects. Consequently, an effort was made to visit the locality at frequent intervals throughout the summer and early fall. Specimens of *H. cincta* were seen and taken on nine occasions from July 7th to July 29th inclusive. After the last date mentioned none were seen. There were a few days within the period indicated when none of them was observed. Of further interest is the fact that not one female was captured, although, with only one or two exceptions, every fly of that species was successfully netted. Probably females were not far away, however.

A total of 28 hovering males were taken. Seven is the largest number captured on any one day. The accompanying table shows that they hover from 8:30 to 9:40 a.m. and from 1:30 to 5:10 p.m. (Eastern Daylight Saving Time.)[1] However, no flies were taken between 10 a.m. and 1:30 p.m. Tabulated field notes also suggest that hovering goes on within rather wide limits (for the season, i.e.) of temperature, relative humidity, and light conditions. Another year an attempt will be made to accumulate more detailed information of this nature.

---

[1] One hour later than Eastern Standard Time.

Table 1

Date	Hour	Males taken	Light	Remarks
7– 7–'48	3:30 p.m.	1		
8	9:40 a.m.	3		
15	2:30–3:30 p.m.	7		
17	12:30–1:30 p.m.	0		
18	8:30–8:45 a.m.	2		Warm, humid, high clouds.
19	3:45 p.m.	4		High overcast.
20	1:30 p.m.	3	10,500 ft. candles	
	2:20 p.m.	1		
21	12–12:30 p.m.	0	5,500–12,000 ft. c.	Very warm, humid, cloudy.
	5:10 p.m.	2	3,500 ft. candles	Missed a third fly.
22	4:00 p.m.	1		
27	2:05 p.m.	0	6,000 ft. candles	
29	2.00 p.m.	4	10,500 ft. candles	Hot and clear.

The light values were all determined with a G-E exposure meter (Model DW-58) using the 100:1 incident light mask. Readings were taken with the meter held vertically (openings up) at shoulder height. Values of 300:1 may be obtained with this instrument by covering two of the three mask apertures. This is necessary for readings above 7,000 foot candles.

The station lies in the Neponset River Reservation along Route 128 in Canton, Massachusetts. The area is somewhat below the road level and the plant cover consists of clumps of young deciduous trees, shrubs, and evergreens with grassy glades interspersed. A bridle path, with evidence of slight usage, makes an irregular loop through the part under consideration. It was only beside the bridle path in two of the larger open places that hovering flies were seen. The two sites are separated by a wooded area a few hundred yards wide. About 80% of the flies were taken at the spot nearest the highway.

Here the first male was encountered. He was hovering in mid-afternoon sunlight and the rich color contrast of his black and red-orange banded abdomen attracted my notice. This species hovers just over the herbs and low shrubs at heights ranging conveniently from 1–4 feet above the ground. My first attempts with the net were unsuccessful. However, I soon discovered a method that was nearly always effective. After approaching slowly within reach, the net may be raised gradually into a position directly beneath the fly. Then, with a swift upward sweep he is readily captured. Hovering flies are not easily disturbed if a person moves unhurriedly. Even if they escape the net at first, they almost invariably return to hover in approximately the same position. Therefore, although they usually evade a head-on or a down sweep, they may be readily captured by the casual approach from beneath.

Hovering is an individual affair for this species. In contrast to the mass hovering of *Tabanus nigrovittatus* Macquart (Bailey, 1947, 1948), usually no more than one or two *H. cincta* males were seen so engaged at the same time. On the few occasions when two or three flies were found hovering in an area, they were always some yards apart and appeared to be acting quite independently.

In conclusion, attention should be called to the fact that this is the first time that hovering during both the morning and afternoon has been recorded for a particular species, as far as I am aware.

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THE DISTRIBUTION OF ONYCHOPHORA IN NEW GUINEA AND NEIGHBORING ISLANDS*

By Charles T. Brues
Biological Laboratories, Harvard University

Just half a century has elapsed since the presence of Onychophora in the Papuan area was first recognized. In 1898 Willey described *Peripatus novæ-britanniæ* from New Britain and since then eight others have been added from New Guinea and other adjacent islands. All of these belong to the genus *Paraperipatus,* but as in the dominant neotropical genera *Peripatus* and *Macroperipatus,* the species are closely similar. However, as they show recognizable and apparently constant structural differences they must be accorded specific or at least subspecific rank. In 1931 Leloup proposed a new name for the whole group of Papuan species, which he designated as *Paraperipatus leopoldi* as a patriotic gesture to the Belgian king. This nomenclatorial *faux pas* was first noticed publicly by Brongermsa ('32) who placed *P. leopoldi* as a synonym of *P. papuensis* Sedgwick. The latter is the first species described from New Guinea and furthermore the types came from the Arfak mountain range not far from the locality where Leloup's types were obtained. However, if several species are recognized this synonomy must remain doubtful.

During his stay as a military officer in New Guinea, Dr. P. J. Darlington of the Museum of Comparative Zoology collected three specimens of *Paraperipatus* in the Bismarck range of the central mountain system near latitude 145° E. They were taken at two elevations on Mount Wilhelm which rises to a height of 15,400 feet, first at an altitude of 8000 ft. in the forest below timber-line and again, in moss, at 10,000 ft. which is above timber-line. This is not very far from the type locality of *P. lorentzi.* There are two males, each with 21 pairs of legs and a single female with 22 pairs of legs. In this

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* Published with a grant from the Museum of Comparative Zoology.

and in the size and distribution of the integumentary papillæ they agree closely with the original description of Horst ('10). I have previously recorded *P. lorentzi* from the Arfak mountains in western New Guinea on the basis of specimens sent me many years ago by Frederick Muir (Brues '21). These western individuals appear to approach *P. stresemanni* in having 23 pairs of legs in all three female specimens. They are now in the collections of the Museum of Comparative Zoology together with those more recently obtained by Dr. Darlington. The accompanying outline map shows the present known distribution of the Papuan *Paraperipatus*.[1]

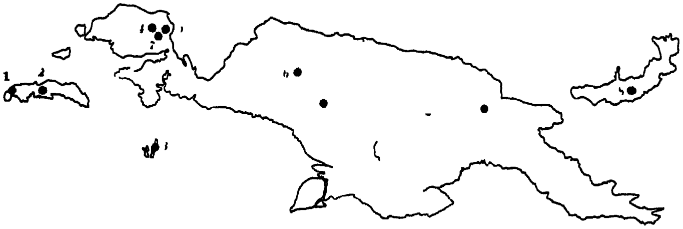

Fig. 1. Map showing the distribution of *Paraperipatus* in the Papuan area. 1, *P. ceramensis* (Ceram); 2, *P. stresemanni* (Ceram); 3, *P. keiensis* (Great Key Island); 4, *P. papuensis* (New Guinea); 5, *P. leopoldi* (New Guinea); 6, *P. vanheurni* (New Guinea); 7, *P. lorentzi* (New Guinea); 8, *P. novæ-britanniæ* (New Britain).

It is clear that they occur very generally throughout the area, but the scarcity of records and paucity of specimens indicates that they are by no means abundant. In New Guinea they seem to be restricted to high altitudes, although this is not true of the neighboring smaller islands.

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[1] The type locality of *P. schultzei* Heymons is too vaguely indicated to place it on the map with full assurance.

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ANOTHER RECORD FOR MANTISPA INTERRUPTA SAY.—A few weeks ago Mr. F. R. Burrill gave me a fine, fresh specimen of *Mantispa interrupta* Say which he had taken in Lincoln on foliage of scrub oak, September 26, 1948. Examination of the collection in the Museum of Comparative Zoology revealed just one other Massachusetts specimen, which had been found at the Blue Hill Observatory, a few years ago, by Dr. C. F. Brooks, on Sept. 16, during a strong south wind. The new record suggests that this interesting Neuropteron may be a member of the fauna of this State. Mr. Burrill's specimen has been deposited in the M.C.Z.—NORMAN S. BAILEY, Boston University, Department of Biology.

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